



A GUIDE TO PROMOTE LEARNER ENGAGEMENT AND EXPERIENCE: Novel Approaches

Edited By

MMDR Deegahawature, PhD

Staff Development Center
Wayamba University of Sri Lanka

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Staff Development Center
Wayamba University of Sri Lanka
Makandura, Gonawila (60170)
Sri Lanka

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Forward

It is with great pleasure that I write this foreword to the latest publication of the Staff Development Center (SDC) of the Wayamba University of Sri Lanka (WUSL), edited by Prof. MMDR Deegahawature under the theme, *“A Guide to Promote Learner Engagement and Experience: Novel Approaches”*. Going beyond its traditional role, the SDC has contributed to the development of academia by facilitating publications in various aspects related to teaching and learning. Certainly, this book marks another significant milestone in its journey towards strengthening the academia.

Learner engagement is central in any educational endeavor as it determines the achievement of educational objectives while making a positive impact on learner experience, performance, employability and retention. The gradual shifts in the education environment have demanded educators to pay higher attention and ensure learner engagement and experience in the teaching-learning process. The present complex environment intensifies the need for searching unconventional and novel approaches to promote learner engagement and experience. This edited book attempts to meet the need. The book includes seventeen interesting chapters under four sections. Considering the impact of the technology dimension, the first section presents several applications of technology to promote learner engagement and experience. The second section presents novel strategies to stimulate learner engagement and experience across disciplines. The third and fourth sections are devoted to the approaches to spur learner engagement and experience in specific disciplines, English language learners and science & technology learners, respectively. Educators, higher educational institutions and policymakers will find that the contents of the book are imperative to them.

I take this opportunity to congratulate the SDC for its commendable involvement to uplift the standards and competencies of all categories of staff at WUSL and other higher educational institutions, thereby contributing to the advancement of the higher education sector in the country. Also, I congratulate the editor and the authors of the chapters. Finally, I wish the SDC, editor and authors good luck in their future endeavours to serve the academia.

Senior Prof. Udith K Jayasinghe
The Vice-Chancellor
Wayamba University of Sri Lanka

Preface

Changes in the learning environment such as technology and bigger classes, the needs of the labour market, the students' social life, etc. have challenged the way the higher education institutes engage in their core process. Over the years, a number of fundamental changes have been happened in education practice to cater those changes. Are those changes sufficient to address the needs of the hour? What can the institutions and teachers do differently to enhance learner engagement and experience? Yet, the innovations are required to include, and engage students in the teaching-learning process, and enhance their experience.

With the aim of providing inputs to institutional development and the policymakers, this book presents the chapters written on enhancing learner engagement and experience in higher education. Particularly, this book presents a number of tools for the promotion of learner engagement and experience under four themes.

In the present environment, modern technology has invaded the teaching-learning process and created novel and unique approaches to facilitate the process. Thus, the first section has been devoted to present several technology-based tools that promote learner engagement and experience. The first chapter presents the appropriate tools to enhance the productivity of learners of the new generation while highlighting the possibility of using an online audience response system owing to its popularity, the availability of smart devices, and access to free online tools. The second chapter summarizes currently available technology-based tools that enhance learner engagement and experience. Further, it presents the details of several tools that help in both the teaching-learning process and assessments with examples. Extending the discussion, the third chapter deliberates the features, purposes, uses of formative and summative assessments. While presenting some inevitable issues that undermine the effectiveness of assessments particularly, in larger classes this chapter highlights the possible applications and benefits of technology-based tools in both formative and summative assessments.

Educators can adopt novel approaches to enhance learner engagement and experience. The second section is devoted to discuss such novel approaches. Chapter four insists on the applicability of multiple intelligence theory to promote learner engagement while explaining the applicability of the theory in the present education setting. Chapter five is about field-based teaching and learning, the success of which is vulnerable to uncontrollable external factors. The chapter discusses the applicability of self-regulated learning models as a tool for enhancing the effectiveness of teaching in such a setting. Chapter six discusses how entrustable professional

activities (EPA) be effectively used in competency-based education, and provides a comprehensive guide for the use of EPA. The seventh chapter argues that learner engagement and experience can be boosted by developing research skills within learners and presents a set of research skills that should be on focus. Adult learners possess unique traits. Chapter eight proposes that learner engagement and experience can be induced by aligning those traits with the learning environment. An interesting case study in the chapter provides evidence for how sharing the role of a teacher with the learner help enhance the learner engagement and experience. Presenting a similar argument, chapter nine proposes that autonomous learning and a conducive work environment foster engagement. Finally, chapter ten deliberates various steps and strategies to achieve higher effectiveness in university-level teaching through applying the concepts of active and wholesome learning.

The third and fourth sections are devoted to the approaches to foster learner engagement and experience in the specific disciplines. Language learning has become one of the priorities in the world. Thus, section three presents several approaches to stimulate learner engagement and experience in English language learning. Chapter eleven identifies peer tutoring and flipping classes as an approach to design a better instructional method to enhance learner engagement and experience. The chapter provides a thought-provoking case of applying such tools in English language teaching. Chapter twelve describes how the peer scaffolding be applied to enhance the effectiveness in teaching English as a second language (TESL) by presenting a comprehensive case study. Chapter thirteen is also about enhancing learner engagement in teaching English as a second language. It presents non-traditional tools and alternative modes of instruction as effective pedagogic practices for facilitating learner engagement.

There is evidence that science, technology, and engineering have become less attractive to learners. Thus, identifying the need of making teaching-learning in these fields of studies interesting, the fourth section is allocated to the approaches in Science and Technology. Chapter fourteen identifies the challenges in promoting learner engagement in the engineering technology education programs through SWOT analysis. Further, it identifies 5E Instructional Model as a viable approach to promote learner engagement in the engineering technology discipline. Further, it explains how a Flipped Classroom can be combined with the 5E Instructional Model for promising outcomes. Chapter fifteen is also about promoting learner engagement and experience in engineering technology education. Insisting on the applicability of the Multiple Intelligences Model in adults' learning, this chapter proposes several steps to stimulate learner engagement and experience. While presenting the prevailing issues in teaching biochemistry to medical students, chapter sixteen proposes a few modern methods that

enable the integration of basic sciences and clinical practice to address the issue. Finally, chapter seventeen explores the possibility of using non-traditional storytelling as a pedagogical tool in Science and Technology education. The chapter presents an interesting case where storytelling was used as a teaching method.

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07th April 2021

Acknowledgment

It is my duty to extend my appreciation to all those who help bring this book out. First, I reserve a special thanks to Senior Prof. Udith K. Jayasinghe, the Vice-Chancellor, Wayamba University of Sri Lanka (WUSL) for all his encouragements and continuance guidance. Also, I am greatly indebted to Prof. Jayasinghe for his insightful forward. As a senior consultant and expert in staff development in academia, his words add immense value to the book. He deserves special thanks for his distinct service to setup higher-standards in staff development in WUSL. Adding all resource persons of the Staff Development Center (SDC) including Prof. Ajith Jayaweera to the list I extend my thanks to them for their contribution.

There are many pillars behind the success of this book. I note the support that I received from the members of the SDC including Ms. Maheshi Anupama. Also, I am grateful to Mr. AL Dilum Kanisha & Dr. AD Dharmawansa for the cover page design, and Ms. RVM Maduwanthi for typesetting. Also, I extend my appreciation to the owner-manager and staff of the Warna Printers, Kuliypitiya. Finally, I extend my gratitude to all authors for their untiring effort to finalize the impactful chapters.

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07th April 2021

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Section 01

Using Technology to Promote Learner Engagement and Experience

CHAPTER 1

Free Online Tools Based Audience Response System: A Practical Solution to Increase the Productivity of Lectures

M. M. Muthuthamby

CHAPTER 2

Use of Smart Tools in Teaching for Enhanced Learner Engagement and Experience

W. A. H. Champa

CHAPTER 3

How Technology Can Enhance Assessment Environment in Large Classes

S. P. D. S. S. K. Karunarathna

CHAPTER 1

Free Online Tools Based Audience Response System: A Practical Solution to Increase the Productivity of Lectures

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Snakes in the Lecture Hall

A decade back when I was a fresher at medical school, I remember a colleague of mine who was seated next to me at the lecture hall was saying, “My goodness, I’ve left my mobile phone in my room, the lecture might get bored any moment you know!” It was an era where our phones were meant for voice calls, short message service (SMS), and snake game. Nevertheless, those basic mobile devices helped the undergraduates to get rid of boredom at the lecture hall.

Rise of the Planet of Smart Devices

A smart device is no longer considered a luxury add-on to one’s lifestyle. These devices are available at an affordable cost, and their uses are enriched with the availability of advanced internet connectivity and open-source software facilities. “Nearly 60% of the world’s population is already online in 2020,” quotes a digital survey report¹. Intriguingly, recent literature from Sri Lanka and the region demonstrated that more than 94% of undergraduates were using portable smart mobile devices^{2,3}. In most instances, these smart devices are connected to multiple social media platforms and more advanced software which would assist one to overcome boredom. In today’s context, when I stand in a similar lecture hall to deliver a lecture, I considered myself at a more challenging position than a lecturer a decade ago.

Detrimental effects of usage of smart devices in those aspire higher education was widely studied worldwide^{4,5}. Also, there is growing evidence that smart devices help undergraduates to improve their motivation and concentration in their academic work⁶. This observation might be due to the surge of innovative education applications in smart devices, and universities are adopting technology-assisted creative teaching-learning activities (TLA).

Achieving Transcendence

Advancement in information technology has led to a change in methods of instructing, delivering, and assessing course work in higher education. In the 21st century, a teacher's role has changed from the usage of hard copy material to the use of web-based visually and technologically enhanced e-learning material. Furthermore, the concepts of blended learning and intelligent adaptive learning are at the peak as the educational community focus on implementing technologically enhanced personalized learning. However, large group teaching methods as lectures are considered an uphill task when implementing personalized learning.

The Butterfly Effect of Feedback

Innovative teaching refers to enable students to explore knowledge and enhance their thinking process to facilitate student-centered learning. This will help the student to achieve higher-order thinking. Thus, implementing ways to identify their personal knowledge gaps is found to be a successful strategy in enhancing student engagement in lectures. Moreover, developing a system to give good feedback to the students is the cornerstone of achieving the above.

Is It a Bridge Too Far for the Developing World?

The audience response system (ARS) is a technologically assisted unit used to increase interaction between the presenter and the audience. Usual ARS comprises of software operated by the presenter device and wireless hardware units operated by the audience in response. These ARS are increasingly used as teaching devices. Evidence shows that using an ARS is a practical, innovative model to increase student engagement and academic performance in large group teaching activities in universities⁷.

Sri Lankan universities continue to deliver most of the teaching-learning activities based on traditional large group teaching due to limitations of resources. The purchasing of ARS is limited due to their higher installation cost. Thus, it is a timely need to identify innovative alternative tools that may supplement ARS to aid in increasing student engagement.

A Divergent Approach

While looking back over the last decade, there is a rapid escalation in technology worldwide, which has enabled ways of means to get rid of boredom. In contrast, academic boredom is at its peak. Recent evidence demonstrates that academic boredom is high as 26% to 59% in lectures across undergraduates from different disciplines⁸. This has proved to have adverse effects on students' academic achievement. On the one hand, educationist refers smart devices as time killers and distractors, on the other hand, some say "keep the mobile phones switched on," it is the way forward in a technologically advanced world.

Now You See Me (in the Lecture Theatre)

It is apparent that university teachers might compromise themselves to lead a parasitic relationship with the technology to achieve student engagement in the modern world. Converting mobile smart devices into an ARS in large group teaching is an emerging innovative approach to tackle the current situation and to restore the popularity of lectures. Even though mobile devices are not specially made for ARS, with the aid of free online tools and software, a semi-automated ARS can be designed without expertise in the field of technology³. This can be seen as a breakthrough to achieve success in economically threatened developing countries.

Smart device-based ARS enables the teacher to assess student's knowledge and misconceptions in real-time, moreover it paves the path to an immediate feedback system, facilitates dialogue with students, and improves students' understanding. A sound feedback system guides students towards self-regulated student-centered learning, which is shown to enhance their academic performance. Intriguingly, evidence showing that using ARS at large group teaching and providing real-time feedback reduces anxiety during examinations⁹. Moreover, there is a higher level of acceptance from students when an ARS is used and immediate feedback is provided^{3,10}.

Inception into TLA

Recently a large group TLA was carried out among undergraduates of Faculty of Medicine, Wayamba University of Sri Lanka, to assess the feasibility of using free online tools to develop a mobile smart device-based ARS model (Fig. 1). A QR code linked, online-form based questioning and answering system was introduced as an add-on to traditional lectures to assess pre and post-lecture knowledge. This aided the teacher and students to get feedback in real-time; furthermore, it enabled the teacher to observe the change in knowledge and attitudes after a TLA, which helped to re-emphasize the areas poorly understood³. Intriguingly, this required little technical competence and time to create and to respond.

Fig.1 shows that Operational scenario starts with facilitator displaying QR code on the screen which enables the audience to access an online form with questions with their smart mobile devices instantly and answer. Following the tailor-made teaching-learning activity, the audience will be made available to the same questions given previously. This aids the facilitator to understand whether the concepts were understood by the audience and to give feedback. This operational scenario is adapted with modifications from Salzer and Reiner¹¹.

Ending an Infinity War

The above mentioned model displayed that using free online tools to supplement TLA was cost-effective, easy to do way to achieve most of

which a highly sophisticated, highly-priced ARS would deliver. Moreover, feedbacks from the students suggested that this model enhanced their engagement in TLA compared to a traditional large group based TLA. Hence, a similar system could be quickly adapted to deliver a student-centered curriculum more efficiently.

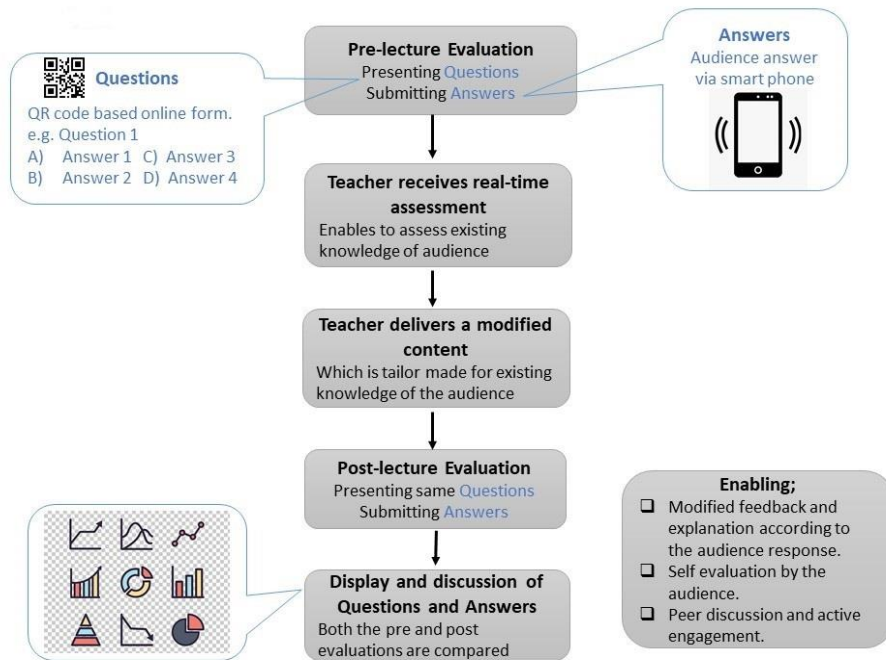


Figure 1: Typical Operational Scenario of the Audience Response System

- ¹ Kemp, S. Digital 2020: Global Digital Overview. January 2020. [cited 2020. 9 May]; Available from: <https://datareportal.com/reports/digital-2020-global-digital-overview>.
- ² Saxena, P., Gupta, S. K., Mehrotra, D., Kamthan, S., Sabir, H., Katiyar, P., & Prasad, S. S. (2018). Assessment of digital literacy and use of smart phones among Central Indian dental students. *Journal of Oral Biology and Craniofacial Research*, 8(1), 40-43.
- ³ Muthuthamby M.M., M.Y., Subramaniam N., Nissankaarachchi R.D., Ranathunga R.A.N. Free online tools: A “do-it-yourself” way to increase productivity of lectures. in Colombo Conference on Medical Education 2019. 2019. Colombo, Sri Lanka.
- ⁴ Kim, H. J., & Kim, J. S. (2015). The relationship between smartphone use and subjective musculoskeletal symptoms and university students. *Journal of Physical Therapy Science*, 27(3), 575-579.
- ⁵ Demirci, K., Akgönül, M., & Akpınar, A. (2015). Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students. *Journal of Behavioral Addictions*, 4(2), 85-92.

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- ⁶ Yamamoto, N., & Wakahara, T. (2013). An interactive learning system using smartphone for improving students learning motivation. In *Information Technology Convergence* (pp. 305-310). Springer, Dordrecht.
- ⁷ Datta, R., Datta, K., & Venkatesh, M. D. (2015). Evaluation of interactive teaching for undergraduate medical students using a classroom interactive response system in India. *Medical Journal Armed Forces India*, 71(3), 239-245.
- ⁸ Sharp, J. G., Sharp, J. C., & Young, E. (2020). Academic boredom, engagement and the achievement of undergraduate students at university: A review and synthesis of relevant literature. *Research Papers in Education*, 35(2), 144-184.
- ⁹ Dibattista, D., & Gosse, L. (2006). Test anxiety and the immediate feedback assessment technique. *The Journal of Experimental Education*, 74(4), 311-328.
- ¹⁰ Dibattista*, D., Mitterer, J. O., & Gosse, L. (2004). Acceptance by undergraduates of the immediate feedback assessment technique for multiple-choice testing. *Teaching in higher Education*, 9(1), 17-28.
- ¹¹ Salzer, R. (2018). Smartphones as audience response systems for lectures and seminars. *Analytical and bioanalytical chemistry*, 410(6), 1609-1613.

CHAPTER 2

Use of Smart Tools in Teaching for Enhanced Learner Engagement and Experience

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Introduction

The author of “Homo Deus – A Brief History of Tomorrow” - Yuval Nova Harari, has mentioned that “for thousands of years, the answer to the question; let’s see what’s on agenda today? remained unchanged”. Famine, plague, and war were always at the top of the list. Again, the humankind is being hit by a plague - the pandemic of COVID 19 today. Most of the affected countries in the world have announced shutdowns in order to keep social distancing aiming to curb the spread of this deadly disease. Having recorded an increasing number of infected patients, the Sri Lankan government has also announced shutdowns and enacted a quarantine curfew island-wide. However, the education sectors in Sri Lanka have been directed to provide education “without interruption” and “without setbacks”¹. Accordingly, state universities have been asked to continue education activities via a distance learning mode, and more specifically, via ‘online teaching’. This emphasizes the importance of infusion of technology into the curriculum and updating the infrastructure to face situations like this which may happen more frequently in the future.

It is well known that young learners of the twenty-first century are attributed by having a close affinity with technology. The term “technology” refers to advancements in the methods and tools we use to solve problems in our day to day personal or professional lives. As academicians, we adopt a variety of technological tools ranging from whiteboard to presentation software, online collaboration, and conferencing tools in our lectures. These novel technologies that invade the market in every second help us to creatively change the teaching and learning styles in physical and virtual environments to maximize the learner involvement.

Young generation tertiary learners who have been born into a technology-based society, have their own style of living and way of learning. In other words, learners now expect to be able to work, learn, and study on

or off the campus at the time convenient for them. With the development of modern high-tech and efficient transport networks, learning has also become mobile. Hence, despite where they are, the learners should be able to connect via virtual or physical networks and wish to have their own personalized learning styles and learning spaces. In this social and cultural milieu, the young generation tertiary learners are highly likely to use cyber networks for sharing subject/course contents among their roster. Common artifacts may include but not limited to photos, video and blog posts, and a range of social media networks such as Twitter, Facebook, Instagram, and Pinterest posts².

Currently, the communication networks set up via social media are dominating over the other printed and electronic modes enabling the user to create connections beyond the usual circles. For instance, smart technology has facilitated to establish connections with eminent professors/scientists in the universities of the developed world, listen to their lectures/talks and use the web resources of these universities to gain subject-related state-of-the-art knowledge. As academicians, we need to guide and instruct our students in the right utilization of the technology to meet learning outcomes.

However, in the Sri Lankan context with limited coverage of telecommunication networks, our students face problems of accessing the content delivered online especially those who live in far remote areas. Similarly, as teachers, we are not well aware and have not received enough exposure and training on contemporary technologies adopted by the universities in developed countries. Moreover, the infrastructure of our universities has not up to the level of satisfaction to facilitate incorporating state-of-the-art technologies into physical or virtual classrooms. Hence, the objective of this article is to discuss the use of state-of-the-art technologies that can be adopted into state universities in Sri Lanka with the purpose of preparing the learners for the technology-based economies.

Learner Engagement

Everywhere in the world, academicians and students in the higher education sector have the challenge to contribute to the economic development of their countries. Yorke³ has reported that this challenge should be taken as a drive to improve student success, achieving high levels of course completion and attaining a passport to employment with a positive attitude to lifelong learning.

According to Kong and Song⁴ higher education in the twenty-first century is expected to meet three goals,

- to develop learners' mastery of expert knowledge specific for major disciplines
- to foster learners' development of generic competencies essential for the twenty-first century

- to stimulate learners' reflection on day-to-day pursuits, especially the learning pursuits

As the technology becomes ubiquitous, infusion of these smart technologies systematically into our curricular and finally applying those in our classroom activities should be the major focus to keep the pace with rapidly developing world. In a higher educational context, the styles of teaching and learning should be more flexible and democratic providing students with more autonomy and control over their learning and encourage the development of cognitive competencies and understanding⁵. Hence, the infusion of smart technologies into the classroom would lead to profound advances in student interactions and learning fulfilling the requirements of a technology-based society. As academicians in the higher education sector, we need to play an integral role in ensuring the right use of technology by our students which may promote their employment.

Learning Spaces in the Twenty-First Century

In the higher education sector, learning takes place in a variety of spaces. For instance, on any given day, the learner would move through a vast and diverse range of learning spaces such as home/hostel, learning/reading while traveling, logging into the learning management system, or attending to lectures at the university. In this setting, it is imperative to educate teachers and learners in the higher education sector on utilizing these vast and diverse learning spaces effectively.

Defining Learning Spaces

Keppell & Riddle⁶ have defined learning spaces as “all spaces where the learner undertakes some form of study or learning”. These may be formal spaces such as lecture halls/classrooms of the university and informal spaces such as home, train, bus, cafes, and other indoor or outdoor places inhabited or customized by the learner.

Hence, according to Keppell & Riddle⁶, learning spaces can be defined as:

- physical, blended, or virtual learning environments that enhance learning
- physical, blended or virtual ‘areas’ that motivate a learner to learn
- spaces where both teachers and learners optimize the perceived and actual affordances of the space
- spaces that promote authentic learning interactions

Physical Learning Spaces

Lecture rooms, tutorial rooms, and laboratories are the physical learning spaces that exist in a traditional university system. Currently, these spaces have been improved with Wi-Fi alongside power adapters for charging electronic devices such as computers, tablets, and phones.

Informal physical learning spaces that exist traditionally in a university are namely libraries and learning commons that have been designed to encourage learners to engage in both independent and peer-learning. However, connections facilitated via Wi-Fi have enabled the students to sit outdoors freely and use their laptops, tablets, or smartphones for accessing the course contents/modules.

Virtual Learning Spaces

This is the learning space that allows learning interactions which are not possible in the physical learning space. These possibilities provide a vast and diverse range of learning interactions such as online discussion forums, blogs, wikis, podcasts, and other smart environments that invade the market in every second.

Personal Learning Environments

Personal Learning Environments (PLEs) support self-organized, informal, lifelong learning and network learning and transform the principle of connectivism into actual practice. In the PLEs, learners are “responsible for creating and maintaining their own learning environments, self-adapted to their individual needs”. Dabbagh & Kitsantas⁷ defined PLEs as “a potentially promising pedagogical approach for both integrating formal and informal learning using social media and supporting student self-regulated learning in higher education contexts”. They further suggest that self-regulated learning is a cornerstone of PLEs and not all students possess these skills to manage their own PLEs.

Currently, available technology tools commonly adopted by the world-renowned universities to promote student learning across a variety of disciplines are given in Table 1.

Table 1. Currently Available Technology Tools that Enhance Learner Engagement and Experience

Technology type	Functions than can be performed	Example tools
Lecture Capture Tools	<ul style="list-style-type: none">• enable students to review the lecture content later• making recordings for future use• Archiving lectures and activities enabling planning.• Alternative for students who missed the lectures• can conduct interdisciplinary courses	<ul style="list-style-type: none">✓ Camtasia✓ Screencastify✓ Capture Space✓ Media site✓ Podcast Recordings

Online Collaboration Tools	<ul style="list-style-type: none"> • enable large/small group discussions • can conduct reading responses, online debates, brainstorming sessions, question, and answer sessions • facilitate collecting, sharing and discussions among the group 	<ul style="list-style-type: none"> ✓ Piazza ✓ Canvas Discussions ✓ Canvas Chat ✓ CTools Forums ✓ CTools Chat
Online video conferencing	<ul style="list-style-type: none"> • offer office hours to off-campus students • permits group interaction, conduct meetings • enable doing lectures when you are out of the faculty • collaborative teaching with instructors at another university • can conduct virtual "field trips" 	<ul style="list-style-type: none"> ✓ Skype ✓ Google+ Hangouts ✓ Apple Facetime ✓ Vview ✓ Zoom
Online writing tools	<ul style="list-style-type: none"> • facilitate individual/group writing • enable peer reviewing • allow collaborative note taking • guide writing for the wider community 	<ul style="list-style-type: none"> ✓ Collaborative writing tools, such as Google Docs ✓ Blogs, such as Blogger and WordPress ✓ Wikis, such as PBWiki ✓ Websites, such as Google Sites or Wix
Personal response system	<ul style="list-style-type: none"> • testing students' knowledge and opinions at the beginning and after a lecture • marking attendance of the students • assist peer discussions and find gaps in understanding of the content delivered. • giving tests and quizzes during lecture • getting students' feedback 	<ul style="list-style-type: none"> ✓ i clicker ✓ LectureTools ✓ Poll Everywhere ✓ Socrative ✓ Google Forms ✓ Piazza

Presentation Technology	<ul style="list-style-type: none"> • Present the lectures attractively with photos, graphs, diagrams, videos • Doing assessments as has been used with personal response systems • offering students to present a part of a lecture to peers • facilitate student on note taking • audio/video recordings of the lecture enable students to review the content later 	<ul style="list-style-type: none"> ✓ Microsoft PowerPoint ✓ Apple Keynote ✓ Google Slides ✓ Prezi
Resource and file sharing	<ul style="list-style-type: none"> • Sharing additional reading materials, assignments, rubrics etc. • Sharing the screen when lecturing, showing videos, etc. • facilitate collaborative work, file sharing 	<ul style="list-style-type: none"> ✓ Canvas Files ✓ Canvas MiVideo or My Media Gallery ✓ Google Drive ✓ Google Sites ✓ Dropbox ✓ iTunes U ✓ YouTube
Screen casting	<ul style="list-style-type: none"> • giving feedback to the students • responding to student learning activities • demonstrating skills • offer possibilities for active learning • conducting tutorials 	<ul style="list-style-type: none"> ✓ Jing ✓ Camtasia
Testing and grading	<ul style="list-style-type: none"> • online gradebook enables conveying grades in real time • testing prior knowledge and pre-testing • conducting quizzes frequently that help keep students with the subject matter 	<ul style="list-style-type: none"> ✓ Canvas Gradebook ✓ Canvas Quizzes ✓ Google Forms ✓ Qualtrics ✓ Survey Monkey

Source: <http://www.crlt.umich.edu/tech-tools>⁸.

Online Collaboration Tools

A common example is “Google docs”. It allows students and instructors to share documents online, edit them in real-time, and project them on a screen. This gives students a collaborative platform in which to

brainstorm ideas and document their work using text and images. In fact, we have made use of this facility in collecting abstracts of final year research students to be published in the proceedings of the Undergraduate Research Symposium of the Faculty of Livestock, Fisheries & Nutrition. The facility enabled the internal and external supervisors to comment and correct it in real-time collaboratively with the student.

Presentation Software (such as PowerPoint)

The use of PowerPoint permits teachers/lecturers to embed pictures, diagrams/illustrations, videos, and audios to enhance the effectiveness of the lecture. Frankly, we did not fully utilize its features until we were forced to stay at home and advised to shift to online teaching suddenly. For instance, using PowerPoint software it is possible to record the lecture with audio/video and upload it to the university learning management system (LMS, if the capacity is compatible) or if capacity is not enough we can upload and share it with our students by creating a YouTube Channel. I am practicing this to deliver the lecture content online adhering to the semester timetable. The following figure illustrates the statistics on views of uploaded lectures by the students.

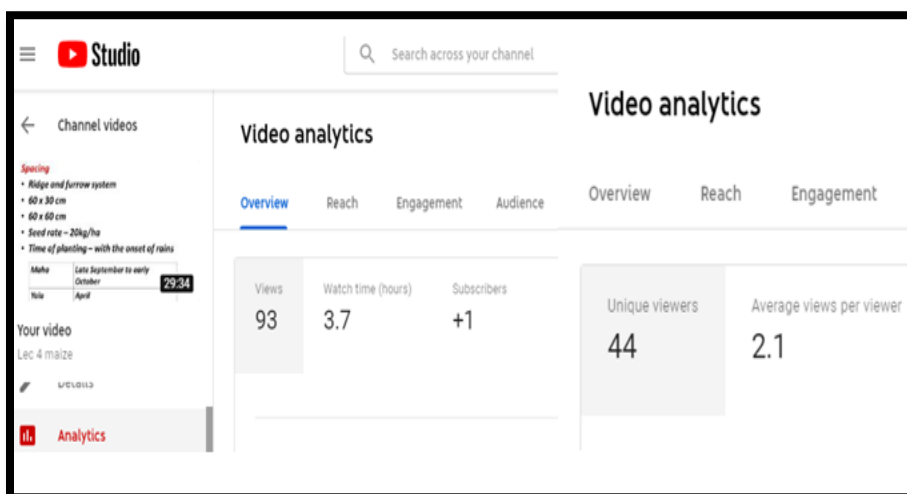


Figure 1. Video Analytics of YouTube Channel Viewers of the Course on LFN 1324 Principles of Food Crop Production 1

As evident by Figure 1, unique viewers are 44 indicating that the whole batch has watched this lecture and some of them have watched it many times as there are a total of 93 views (link to access this YouTube channel was given only on the LMS page of the students who follow LFN 1324 –Principles of Food Crop Production 1). This is one of the good examples of the use of PowerPoint in delivering lecture content online for

young generation tertiary education learners' enabling them to work, learn, and study whenever and wherever they want.

Learning Management Systems - Canvas

It is a learning management system (LMS) that facilitates lecturers to organize all the resources needed for conducting a course module online such as uploading lessons, additional reading materials, assignments, conducting assessments, provide grading, and generating discussions, sharing documents, and making video and audio appraisals.

Clickers

Clickers are wireless handheld devices that allow students to respond individually to in-class quizzes and convey their responses to the lecturer's computer in real-time. This device is also known as a type of Classroom Response System (CRS). Use of this tool permits the real-time assessment of students' knowledge or opinion on the subject matters and easily work with multiple-choice questions.

I have my own experience in this regard during my participation to certificate course on "Postharvest Technology of Horticultural Crops" which was hosted by Postharvest Technology Center of the Department of Plant Science, University of California, Davis, California, USA; from June 13-24, 2016. In fact, it was interesting, and it helped keep the learner's attention towards the lecture and created a sort of competitive environment amidst the participants.

However, to get correct evidence on whether the learner understood the content delivered in a lecture properly, he/she needs to sensibly select or set the questions and need to decide the right time to display the question. In addition to testing students' knowledge and opinions at the beginning and after a lecture, it facilitates marking the attendance of the students, assists peer discussions, and finds gaps in understanding of the content delivered.



Plate 1. Students Responding to a Question During a Lecture Using Clickers

Lecture-capture Tools

Lecture capture tools such as Panopto, allow lecturers to record lectures on their own computers without asking for support from technical assistants and with no additional tools or equipment. Studies have shown that posting recorded lectures into LMS does not pose any negative impact on students' attendance and instead, they are cherished on excellent possibilities that they received for reviewing lectures at their own pace.

According to the University of Michigan (<http://www.crlt.umich.edu/tech-tools>), the uses of Panopto comprise,

- recording demonstrations or tutorials that students are ought to watch several times
- recording lectures of the external resource persons/professionals who cannot come during office hours to deliver the lectures as per the semester timetable of the faculty
- provide the opportunity for students to listen to eminent scientists professionals in their subject who work in other universities/research institutes of the world
- provide students with audio/video feedback about their assignments and papers
- document a summary of the classroom activities performed over a certain period (weekly, monthly) and give an outline on future activities
- have students record presentations, conduct interviews, viva-voce assessments, document commentary, take part in a debate, etc.

Camtasia and Screencastify

These are powerful tools that enable screen casting, video editing, and share. Lecturers can decide which area of the screen needed to be recorded and incorporate audio/video clips to make effective teaching aids.

Tools for Online Assessments

Hot Potatoes

The Hot Potatoes is an excellent tool created by the Research and Development team of the Humanities Computing and Media Centre, University of Victoria, Canada, which facilitates creating interactive web-based exercises.

Hot Potatoes v. 7.0 is freeware, and the academic staff of the Faculty of Livestock, Fisheries & Nutrition was given a training on how to create web-based exercises such as crossword puzzles, gap fill exercises during the period when the University was shut down for the students due to COVID 19 pandemic. After restarting the University, I conducted a mid-semester examination by using this Hot Potatoes v. 7.0 for the course on LFN 1324 –

Principles of Food Crop Production 1 and Plate 2 indicates the students doing the examination enthusiastically. This saved a big portion of my time as I was free from the burden of marking answer scripts of nearly 65 to 70. Students were also happy as they got marks soon after they submitted the answers and they also received feedback for the answers which were incorrect. Moreover, they could do the test from any place as it was not mandatory to come to the faculty to face for the examination (some repeat students of the previous batch did the test without coming to the faculty). This enabled keeping the social distancing as well which is a mandatory requirement currently.



Plate 2. Students Who Follow the Course Module on LFN 1324 – Principles of Food Crop Production 1, Doing a Web-based Assessment Created by Hot Potato V.7.0.

Peer Wise

Peer Wise could be introduced as an online bank of multiple-choice questions in which students can create, share, and answer⁹. A question can be in the form of text and can also include images or links to web resources such as videos. This tool facilitates the students to explain their understanding of subject related questions, and to answer and discuss questions created by their peers. Moreover, the students are enabled to rate

the questions for difficulty and quality. Further, the questions can be tagged to group them into themes and topics of importance. In summary, students could design the question, share with their peers to see what others think, and learn from their peers thus it acts as a motivator and can be termed as a heady tool for enhancing students' engagement in teaching, learning, and assessments.

Edmodo

Edmodo is a technological learning platform that facilitates online discussions, shares content, distribute various forms of assessment, and promote student-teacher communication¹⁰. It offers students the opportunity of asking questions, reviewing the content, communicate with their peers, and keep in contact with the lecturers. The lecturers are also enabled to set up online classes, enroll students, convey the messages, or information related to the course, make notifications, and upload/share course materials/lessons.

Once we create an account, it allows both teachers (via teacher account) and students (student account) to connect with batch mates and other colleagues/teachers in similar fields and share resources/ knowledge. Moreover, it also permits to have immediate contact with the teacher/instructor/lecturer and colleagues, discuss subject matters covered in the class, and review course material. In summary, despite the fact that where the students and teachers are, it creates a community of teaching and learning.

Barriers for the Implementation of Technology in State Universities in Sri Lanka

As already mentioned, infusion of smart technology into our curriculum would provide immense benefit for both lecturers and learners to facilitate personalized teaching and learning. However, it is imperative to provide opportunities for the academic staff to gain a high level of competence on these smart tools enabling them to apply those in their teaching practices which may finally contribute to enhance the learning process for students.

According to the reports published by Miller et al¹¹ and Kulassoriya¹², students have shown high levels of satisfaction with the use of educational technology as it permits them to interactively participate in learning. They also think that technology helps a better understanding of course content leading to scholarly achievement in their educational lives while making them ready for the technology-dependent workforce¹³.

In this context, the following points can be listed as barriers on implementation of the technological tools discussed so far,

- lack of funding to afford state-of-the-art technology
- underdeveloped/obsolete infrastructure
- lack of technology-infused curriculum
- inadequate training for both the staff and students
- lack /unaffordability of devices to get connected
- inadequate coverage of telecommunication networks
- high cost of telecommunication

Constraints from the learners' point of view

- sense of isolation during learning
- hassle in connecting with peers
- distraction with other applications
- difficulty in setting boundaries between class and personal life

Conclusions

As technology becomes increasingly demanding in the fields of education as well as in industry, it is imperative for both staff and students getting used to these technological advancements. Infusion of smart digital applications into the curriculum would not only offer exciting possibilities to broaden the skills of our undergraduates but also upon graduation, make them ready to tackle the problems confronting their respective job fields. In the higher education sector, we are forced to shift from teacher-centered learning towards outcome-based student-centered learning. Hence, it is important to come up with strategies for the effective implementation of said technologies in the teaching and learning process. As the technology is boosting at a rapid rate with distinguishing features, it is the duty of administrative authorities to make provisions for both teachers and students to get adequately updated on these smart tools. As teachers, it is our responsibility to direct these young learners in the right path to avoid misusing the technology as well as to protect them from being frustrated.

Finally, the University Grant Commission (UGC) needs to intervene in setting up a policy for the infusion of these smart technologies into the teaching and learning process. Moreover, the UGC should direct the government to facilitate establishing wider coverage of telecommunication networks and to offer a concession on telecommunication charges/tariffs for education institutions, teachers, and students.

¹ Gazette Notification 2169/02. *The gazette of the democratic socialist republic of Sri Lanka, Extraordinary*, dated 31.03.2020. Retrieved from www.documents.gov.lk.

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- ² Keppell, M. (2014). Personalised learning strategies for higher education. In *The future of learning and teaching in next generation learning spaces*. Emerald Group Publishing Limited.
- ³ Yorke, M. (2006, July). Student engagement: Deep, surface or strategic. In *Keynote address to the 9th Pacific Rim Conference on the First Year in Higher Education, Griffith University, Australia* (pp. 12-14). Retrieved from <https://www.researchgate.net/publication/252918591>
- ⁴ Kong, S. C., & Song, Y. (2015). An experience of personalized learning hub initiative embedding BYOD for reflective engagement in higher education. *Computers and Education*, 88, 227-240.
- ⁵ Buckingham, D. (2003). *Media education: Literacy, learning and contemporary culture*. Cambridge: Polity Press.
- ⁶ Keppell, M., & Riddle, M. (2012). Distributed learning places: Physical, blended and virtual learning spaces in higher education. In M. Keppell, K. Souter, & M. Riddle, *Physical and virtual learning spaces in higher education: Concepts for the modern learning environment* (pp. 1-20). Hershey, Australia: Information Science Publishing.
- ⁷ Dabbagh, N., & Kitsantas, A. (2012). Personal learning environments, social media and self-regulated learning: A natural formula for connecting formal and informal learning. *Internet and Higher Education*, 15(1), 3-8.
- ⁸ Center for Research on Learning and Teaching, University of Michigan. (n.d.). *Choosing your technology*. Retrieved from <http://www.crlt.umich.edu/tech-tools>
- ⁹ Biggins, D., Crowley, E. J., Bolat, E., Dupac, M., & Dogan, H. (2015). Enhancing university student engagement using online multiple choice questions and answers. *Open Journal of Social Sciences*, (3), 71-76.
- ¹⁰ Purnawarman, P., Susilawati, S., & Sundayana, W. (2016). The use of Edmodo in teaching writing in a blended learning setting. *Indonesian Journal of Applied Linguistics*, 5(2), 242-252.
- ¹¹ Miller, J. P., Milholland, E. S., & Gould, S. M. (2012). Determining the attitudes of students toward the use of a classroom response in hospitality courses. *Journal of Hospitality and Tourism Education*, 24(2-3), 73-79.
- ¹² Kulassoriya, D. M. A. (2020, April 26). NIBM worldwide: A total solution for online teaching. *The Sunday Times*. Retrieved from: <https://www.pressreader.com/sri-lanka/sunday-times-sri-lanka/20200426/282729114047614>.
- ¹³ Schindler, L. A., Burkholder, G. J., Morad, O. A., & Marsh, C. (2017). Computer based technology and student engagement: A critical review of the literature. *International Journal of the Educational Technology in Higher Education*, 14(1), 1-28.

CHAPTER 3

How Technology Can Enhance Assessment Environment in Large Classes

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Introduction

Teaching Learning Process (TLP) is the most powerful instrument of education, which brings desired changes in the students. As TLP is in a state of transition, it can be divided into the “old” and “new” method. In the “old” method of TLP, the teacher behaves as an authority. Also, the teacher stands before the class and presents the materials for learners. Therefore, the “old” method has failed to enhance higher-order critical thinking, problem-solving and decision-making skills of students, that is, the “old” TLP is rigid and outdated¹. The “new” TLP consists of four basic elements, which are listed below:

- Assessment
- Planning
- Implementation
- Evaluation

Moreover, the “new” TPL is not a back and forth process. It is a cyclical process. Assessment plays a crucial part in the teaching-learning cycle. The Figure 1 signifies how assessment bridges the teaching and learning cycle.

Assessment, therefore, bridges teaching and learning². Moreover, assessment aligns with Bloom’s taxonomy and is a main aspect of the curriculum. In addition, standardization of education and increased access to education cause to have large classes in universities. Therefore, teachers use assessments to manage the challenges posed by large classes. However, there are some issues of assessment in large classes. Therefore, teachers use various technological tools for monitoring and accessing student progress³. As assessment plays a major role in enhancing the teaching-learning environment, this article devotes to examine the kinds of assessment and the role of assessment in TLP. In particular, we focus on how the technology affects to alter the assessment culture, and feasible assessment methods for

large classes since technology came across TLP due to COVID-19. Moreover, in today's classroom, technology is not a novelty.

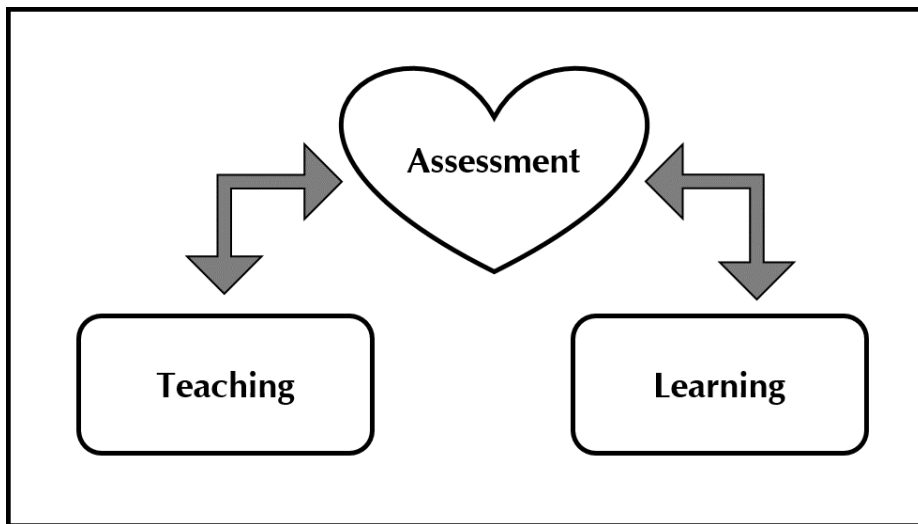


Figure 1. Assessment Bridges Teaching and Learning Cycle

Assessment in Higher Education

There is a common saying “practice makes a man perfect”, that is, it is not possible to achieve perfection in any field that we pursue without practice. The assessment provides learners the opportunity to practice the materials in their field of interest. Knowledge is external, objective, and discoverable and involves recognizing “real” facts, “correct” solutions, and “true” theories¹. Therefore, knowledge is weakened when the assessment is missing or inadequately addressed. By knowing or not knowing, some teachers think that assessment is a way to find out whether the students are learning. However, the assessment provides information to improve student's learning and teacher's teaching. The teachers have an opportunity to moderate the content, pace, and method of delivering instruction through assessment. In addition, assessment is used for selecting students, motivating students, maintaining standards, satisfying public expectations, and accountability⁴. The teachers and students are eventually benefited from assessments. Consequently, assessment controls education. The benefits of assessments can be organized as benefits for teachers and benefits for students⁵.

Benefits of Assessment

Benefits for Teachers

- Appropriately administered and analyzed assessment provides the information on whether the content and pace of instruction are adequate.

- The instructor may monitor how much students are learning.
- The assessment helps to determine the most successful teaching methods for each group of students.

Benefits for Students

- Frequent assessment and feedback put students on track.
- Assessment fosters the students to self-assess.
- Students measure whether they have mastered in individual concepts and skills.

Therefore, teacher observations, classroom discussions, and analysis of students' work (homework, tests, essays, reports, etc.) are included in assessments. In conclusion, assessment can be defined as all activities that teachers and students undertake to get information on what can be used to alter teaching and learning⁶. The assessments have been categorized as formative and summative. They are essential parts of any curriculum map, and they are equally important in TLP. Formative and summative assessments are described in the following sections, respectively.

Formative Assessment

There is no common definition for formative assessment. However, if the information of some assessments is used to adapt teaching and learning to meet student needs then such assessments become formative. Formative assessment is sometimes called as an assessment for learning and assessment as learning. Formative assessment overviews the student understanding (cognitions), the gap between the student's current level of knowledge and skill, and the level of knowledge and skill required to achieve the desired goal (learning needs), academic progress during a lesson, unit, or course/module⁷. In addition, teachers identify what students know and understand, concepts that they are having difficulty earning and learning standards they have not yet met.

Consequently, teachers can adjust the content, instructional techniques, and academic supports while a student can enhance their learning based on their achievement. Simply, formative assessments provide ongoing feedback for both teachers and students. In addition, formative assessment meets the goals of lifelong learning. However, formative assessment is low-stakes, that is, has low or no points.

Students and teachers should integrate and embed the following practices to obtain effective use of the formative assessment process (FAST SCASS, 2017):

- Set clear learning goals and success criteria within a broader progression of learning.
- Obtain and analyze evidence of student thinking.

- Assess yourself (self-assessment) and collect peer feedback.
- Provide clear and feasible feedback.
- Adjust learning strategies, goals, or next instructional steps using evidence and feedback.

Summative Assessment

Summative assessments are used to evaluate student comprehension at the end of the unit, module, semester, program, or school year⁴. It is sometimes called as an assessment of learning. Summative assessment often takes the form of standardized tests, projects, or district benchmarks. It is high-stakes. A grade or percentage can be used to measure summative assessment. However, the measurement method depends on the module.

Summative assessments are basically used to make a judgement about the achievement of students on a module. Moreover, the students are certified for achievement and awarded a qualification. Indeed, the summative assessment provides formal evidence of the student's competence⁸. In addition, summative assessment contributes to improving curriculum and curriculum planning since summative assessment data represents the gap between student knowledge and learning outcomes. Using improved curriculum planning and new learning criteria, the attainment level of the institution can be improved. Also, the summative assessment allows teachers to alter the way of teaching a certain unit or chapter. Therefore, summative assessment measures not only the achievement of students, but also the achievement of teachers and institution⁹. In conclusion, summative assessment can be defined as any method that can be used to measure the students' understanding, typically against standardized criteria after an instructional period has been completed¹⁰.

The Figure 2 Venn diagram summarizes the similarities and differences between formative and summative assessments.

Assessment Tools

TLP is changing with students, teachers setting, course materials, and other resources. A variety of assessment tools and techniques is therefore utilized to improve TLP. In particular, assessment tools and techniques permit students to improve the quality of learning and measure their progress. In addition, teachers get feedback about their effectiveness as a teacher and gather some important information on what, how much and how well students are learning. Assessment tools can be divided as direct tools and indirect tools. Direct tools inspect student learning while indirect tools help students to reflect on their learning¹¹. For instance, concept maps, concept tests, exams, oral presentations, poster presentations, peer reviews, portfolios, rubrics, and written reports are some direct tools, and knowledge surveys and interviews are some indirect tools for the assessment. Both direct

and indirect tools may be used to assess literacy in an ongoing, nonintrusive, productive, and nonthreatening manner.

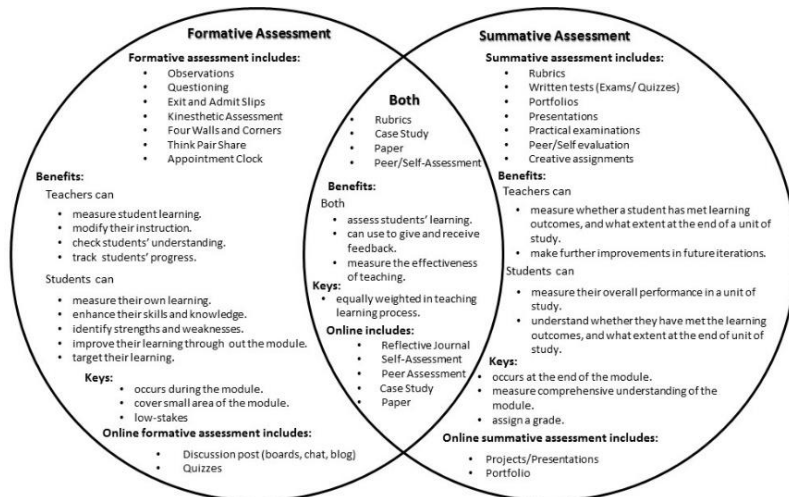


Figure 2. Interrelationship between Formative and Summative Assessments

Assessment in Large Classes

As a university degree prepares the students intellectually and socially for their carrier and their adulthood, university graduates have several opportunities than high school graduates. For instance, more earning potential, bridge to childhood and adulthood, gain new skills, expand carrier options, see the world are the few opportunities that university graduates have. In addition, a university degree is a milestone in someone's life. Therefore, more students enroll in higher education than ever before today. Consequently, large class environments are common in higher education. In addition, students do not participate and actively engage in large classes due to perception of authority, perception of the instructor, and fears of peer judgement¹². As previously mentioned, assessment is the heart of TLP and can be used to manage issues in large classes. However, assessing students in large classes is a challenge. Mainly, the following reasons lead to create a barrier to the perfect assessment process in large classes¹³.

- **Marking and Grading a Large Number of Assessments Increased the Chance of Inconsistency.**

We expect a diverse and complex cohort of students in a large class. Therefore, culture and educational background, prior knowledge, and level of interest in the subject cause to different perceptions towards assessments. In addition, these factors are challenging the consistency of marking and grading. To take all these into account, clear grading criteria is essential.

- **Providing Sufficient and Prompt Feedback to Individual Students is Not Practical.**

For a large class, it is impossible to provide detailed and constructive feedback to individual students due to time constraints. However, students can identify their own drawbacks through feedback and enhance the learning process if they receive feedback at an early stage of their learning process. In general, most teachers therefore, manage to provide general feedback to their students on written assessments (assignments and tests).

- **Lack of Interaction and Engagement**

Interaction between students and teacher is important to make the teaching and learning process successful. However, students are less motivated to actively participate in a large class. For instance, no many students are motivated to respond if the teacher tries to clarify things related to the lecture. This is because some students feel uncomfortable to ask questions and give their comments. Therefore, they tend to hide themselves in a large class.

- **Plagiarism**

Plagiarism is a common issue in higher education. Identifying individual students within a large class is difficult, and teachers have a heavy workload and tight marking schedule. Plagiarism is therefore a huge challenge when assessing large classes.

There are therefore limited choices of assessment tasks for large classes. However, as Multiple Choices Question (MCQ) and short answer exam questions are time-efficient and exam-based assessment methods, MCQ and short answer exam questions can be used as assessment tasks for large classes. The followings are some alternatives that can make a formative assessment of large classes feasible¹⁴.

- **Diagnosis of Students Prior Knowledge**

As students in a large class have diverse academic backgrounds, it is better to know their prior knowledge of course concepts and their expectations from the course. A quick assessment may be used to measure students' prior knowledge and their expectations. This quick assessment is called as a diagnostic assessment, which holds at the beginning of the course. The diagnostic assessment may be done with a short MCQ test using either a paper-based or electronic-based (clicker system). The diagnostic assessment helps to identify the potential content and other challenges faced by students. Moreover, subsequent measures help students to grasp the key concepts of the topics.

- **Model Answers and Feedback**

Giving individual feedback is not possible for large classes due to time constraints. Therefore, a feedback sheet with a list of the most common problems along with an explanation/model answer, leaving verbal feedback and suggestions on how to improve lecture or tutorial sessions can be prepared to collect the feedback within given time constraints. Moreover, a standardized score sheet can be used to provide feedback to individual students. This standardized score sheet has checkboxes, which are corresponding to assessed criteria or characteristics in work.

- **Self and Peer Assessment**

Students can assess their own and other work, which is called self and peer assessments, respectively. Therefore, self and peer assessments reduce the workload of teacher due to marking and grading assessments required a considerable amount of time.

- **Clickers/ Personal Response System**

We show that clickers can be utilized to assess students' prior knowledge and identify common misconceptions of a topic. Moreover, one can use clickers to give few concept questions from the lecture to answer. Students' responses conclude that whether further instruction is required.

Therefore, assessing a large number of students in an efficient way is a challenge for teachers. In particular, the following assessment strategies may be useful with a large class: concept test, exams, scoring rubrics, minute paper, and technology. Technology is hence a way to assess large classes.

Role of Technology in Assessment Process

As previously mentioned, assessment is a vital stage of the teaching and learning cycle. Over recent decades, teachers are therefore seeking possibilities for embedding technology into assessment since technologies and tools have potentially beneficial characteristics such as personalized, instantaneous, and engaging. In the 21st century, assessment of students' performances inside and outside the classroom has been shifted since students in this century do not like conventional assessing methods. However, universities are slow to adopt technology in TLP, in particular, technology in assessment and practices¹⁵.

As students can create and display their work online through social media, YouTube, and digital portfolios, they can be assessed using technology. Moreover, many universities encourage their students to contribute to online blackboards and forums. Technology is therefore

coming to play a crucial part in learning and student performance in the near future; in particular, COVID-19 induces to quickly transition even face-to-face to online classes. In the Sri Lankan context, a learning management system (LMS) is widely used in the teaching and learning process.

Online Assessments

The online assessment environment facilitates for frequent and varied assessments, compared to the conventional assessment strategies¹⁶. For instance, online discussion, Bulletin boards, online exams, online quizzes, computer-marked assignments/exams, portfolios, etc. Moreover, online assessments help to reduce the workload of teachers. The workload of teachers depends on the number of classes, the number of students in each class. Technology allows to cater assessment in many different ways. Among these, online assessments are critical because it helps to track student progress over time. The followings are some advantages of online assessments¹⁷.

- **Increase Flexibility**

Different students have different learning styles and needs. Therefore, students want to access and complete their assessments at a time that best suits for students. The online assessment process provides this flexibility.

- **Improve Feedback**

Using real-time assessments and polling, teachers can assess student comprehension in the moment of learning. Based on the results, one identifies and addresses any gaps in knowledge, teachers alter their instructions to match the needs of each student. In addition, some digital tools provide comparisons with peers' work, that is, similarities and differences. Students are therefore able to identify overlapping and missing core concepts through such digital tools.

- **Recognize and Cater for Differences**

Teachers create different assessments to meet the needs of all students. Sometimes, this process is painful and time-consuming. Online assessments make this process a lot easier. For instance, the online assessment provides an opportunity to set different questions for different students, depending on their ability and interest. This process increases engagement and improves the learning process.

Methods of Online Assessments

There are different types of online assessments, which assist teachers and students to enhance TLP. Teachers can use these methods alone or as a

combination to assess the students learning. Here we discuss some of the most common and widely used techniques that greatly affect actively engaging students in the assessment environment, supporting student learning, and providing useful information on ongoing assessments. In particular, given techniques suit for large classes as well.

Formative Assessments

- **Discussion Post (online discussion, bulletin boards, blogs, chat)**

The lack of interaction and engagement are common issues for large classes. The lack of interaction causes for student learning and student perceptions of learning. Moreover, the teacher and student interaction is crucial in the assessment process and on student achievement¹⁸. In addition, the interaction between and among students and the teacher is higher than in the conventional classroom when using online assessment techniques¹⁹. In particular, discussion post provides a platform to improve the interaction between teacher and student and among students. In a discussion post, individuals or groups can create a conversation on various topics related to the module while the teacher induces the conversation by giving interesting points and showing different approaches (the teacher can break the major topic into multiple topics).

- **Quizzes (online quizzes, computer-marked assignment)**

Self-Assessment is a solution to provide sufficient and prompt feedback to individual students in a large class. In this case, students must participate in the assessment of their own learning because they can get an idea of whether they are on the track to meet the required learning objectives¹⁸. Therefore, through online self-testing, students can measure their learning and achievement. Particularly, as students get feedback quickly, quizzes are the best way for self-assessment. Using quizzes, students can measure their current knowledge and assess their achievement. Moreover, it allows students to determine the course content and tells them where they are in the learning process. In addition, giving quizzes for large classes is time-consuming and increasing the workload of the teachers. Therefore, online quizzes and computer-marked assignments can be used to obtain the advantages mention above while solving some practical matters.

Summative Assessments

- **Midterm/Final Exams (online exams)**

As proctored exams promote identity security and academic honesty, proctored exams are the best to assess face-to-face and

distance classes. However, it is not practical for a large class during a pandemic like COVID-19. Teachers, therefore, need the assistance of technology to handle such situations. Teachers can introduce mechanisms in LMS to increase academic integrity. For instance, WeBWork is an open-source online homework system. It targets most lower-division undergraduate mathematics courses and some advanced courses. Using WeBWork, we can promote identity security and academic honesty. Also, one can use the features of the blackboard. Similar LMSs are also available to use.

- **Projects/ Presentation**

Projects are unique and relevant to the individual learner. Moreover, projects help to solve identify security and academic honesty problems²⁰. For large classes, marking and grading projects are time-consuming and extra burden for teachers. In addition, it is important to receive peer feedback for individual projects and members in-group projects. It is not easy and practical for large classes. Fortunately, technology makes life easier because some online environments provide immediate feedback for students and teachers. During pandemics like COVID-19, technology facilitates to hold a presentation. For instance, Ph.D. is one of the highest achievements in higher education. However, to complete the Ph.D. students must present (defense) their work. During COVID-19, Ph.D. candidates around the world are using technological tools to present their work and complete Ph.D. programmes successfully.

- **Portfolios**

Portfolios can be used to accurately measure academic and professional skills. It leads to enhance both the document and meta-cognitive skills of students²¹. Moreover, students get an update about his/her own skills. In addition, students have a chance to improve their creativity since they use combinations of papers, audio/video, and/or presentations in their portfolios. The electronic portfolio becomes a personal and professional information management system that plays a crucial part in the pedagogy of online learning in higher education.

The next most important thing is that online assessment techniques align with cognitive levels in Bloom's Taxonomy of teaching, learning, and assessments. The Table1 summarizes the relationship between Bloom's Taxonomy and online assessment techniques.

In this article, we examine the importance of assessment in the teaching-learning process. Assessments bridge teaching and learning. In addition, we have discussed assessment methods that the teachers can use

in their classes. We discussed some issues of assessment in large classes. We proposed some possible techniques to assign assessments and actively engage students in large classes. Then we realized that technology could appropriately use to assess large classes successfully. Moreover, the technology works as a ventilator in teaching and learning during COVID-19 and any other disasters.

Table 1. The Relation between Bloom's Taxonomy and Online Assessment Methods

Bloom's Taxonomy	Online Assessment Methods
Knowledge	Quizzes: Multiple choice, True/False, Matching, Fill-in-the-blank, Short answer, Flash cards, Games
Comprehension	Tutorials, Simulations, Animations
Application	Case studies, Games, Simulations, Tutorials, Essay, Short answer, Multiple choice
Evaluation	Projects, Portfolios, Presentations, Virtual labs, Case studies, Essay, Multiple choice

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- ¹ Luther, A. (2000). The "Old" method of teaching vs. the "New" method of teaching. *Journal of Thought*, 35(2), 59-69.
 - ² Wiliam, D. (2013). Assessment: The bridge between teaching and learning. *Voices from the Middle*, 21(2), 15-20.
 - ³ Awan, A. G., & Kamran, A. (2018). Testing and assessment of large classes in English language. *Global Journal of Management, Social Science and Humanities*, 4(3), 622-650.
 - ⁴ Sekyi, E. T. A. (2016). Assessment, student learning and classroom practice: A review. *Journal of Education and Practice*, 7(21), 1-6.
 - ⁵ Thomas, J., Allman, C., & Beech, M. (2004). *Assessment for the diverse classroom*. Florida, USA: Florida State University.
 - ⁶ Black, P. and Wiliam, D. (1998). Inside the black box: Raising standards through classroom assessment. *The Phi Delta Kappan*, 80 (2), 139-148.
 - ⁷ Sadler, D. R. (1989). Formative assessment and the design of instructional systems. *Instructional Science*, 18(2), 119-114.
 - ⁸ Awoniyi, F. C. & Fletcher, J. A. (2014). The relationship between senior high school mathematics teacher characteristics and assessment practices. *Journal of Educational Development and Practice*, 4, 21-36.

-
- ⁹ DeCesare, D. (2002). How high are the stakes in high-stakes testing? *Principal*, 87(3), 10-12.
- ¹⁰ Summative Assessment: Definition & Program Outcome. (2017, March 31). Retrieved from <https://study.com/academy/lesson/summative-assessment-definition-program-outcome.html>.
- ¹¹ Prasanthi, B. V. & Vijetha Inti, V. V. (2019). Assessment Methods and Tools: A Review. *International Journal of Research and Analytical Reviews*, 6(2), 94-97.
- ¹² Weaver, R. R., & Jiang, Q. (2005). Classroom organization and participation: College students' perception. *Journal of Higher Education*, 76(5), 570-601.
- ¹³ Chan, C. (2010). *Assessment: Assessing Large Classes*, *Assessment Resources @HKU*. Hong Kong: University of Hong Kong.
- ¹⁴ Angelo, T., Cross, K. P. (1993). *Classroom assessment techniques: A handbook for college teachers*. San Francisco: Jossey-Bass.
- ¹⁵ Shute, V. j., Dennen, V. P., Kim, Y. J., Donmez, O., & Wang, C. Y. (2010). 21st Century Assessment to Promote 21st Century Learning: The Benefits of Blinking. A report for Digital Media and Learning network. Accessed from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.454.9853&rep=rep1&type=pdf>.
- ¹⁶ Meyen, E. L., Aust, R. J., Bui, Y. N., & Isaacson, R. (2002). Assessing and monitoring student progress in an e-learning personnel preparation environment. *Teacher education and special education*, 25(2), 187-198.
- ¹⁷ Kibby, M. (2003). Assessing students online. (2002, March 3). Retrieved from <http://www.newcastle.edu.au/discipline/sociol-anthrop/staff/kibbymarj/online/assess.html>
- ¹⁸ Robles, M., Braathen, S. (2002). Online assessment techniques. *The Delta Pi Epsilon Journal*, XLIV(1), 39-49.
- ¹⁹ Draves, W. A. (2000). *Teaching Online*. River Falls. Wisconsin: LERN Books.
- ²⁰ Rovai, A. P. (2000). Online and traditional assessments: what's the difference? *Internet and Higher Education*, 3(3), 141-151.
- ²¹ Dewald, N., Scholz-Crane, A., Booth, A., & Levine, C. (2000). Information literacy at a distance: Instructional design issues. *The Journal of Academic Librarianship*, 26(1), 33-44.

Section 02

Novel Strategies for Promoting Learner Engagement & Promotion

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CHAPTER 4

Revisiting the Multiple Intelligence Theory to Enhance Student Engagement in Higher Education

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Preamble

Education is a privilege and a right. Hence, tertiary education is invaluable for individual prospects and not only for the growth and wellbeing of society in a country. Nonetheless, not everyone passes out of school is ready for higher education. Many students who enter the university system are either poorly prepared or unaware of the burdens of higher education, and subsequently underachieve, underperform in their examinations, tasks, and other requirements, or either ended up dropping out of the institution or graduating with marginal qualifications¹. This is unpromising to the individual, wasteful of valuable educational resources, and is unproductive to the nations. Educational accomplishment plays a crucial role for every citizen as it can pave the path to improved social status and life qualities, higher earnings, good quality employment, and overall economic prosperity².

Thus, university docents have an obligation to expand their teaching and learning activities to proliferate the tertiary degree enrollment, minimize the dropout rates, and bolster student participation in active learning. Having a better understanding of learning theories as a part of the staff development process is, therefore, a necessary and timely addition to combat the negative effects of poor student enrollment, participation, and prompt graduation in the university system. Learning theories and related research usually provide imperative acumens into how learners learn and how can educators expand the student learning process to cater to the growing needs of the society or place of work³. Such theories can strengthen and aid in changing the current landscapes of higher education. Though, ill-advisedly, contemporary educators typically encircle one or two of the four foundational learning-theory domains, namely 'behaviorist theories, cognitive theories, constructivist theories, and motivation/humanist theories', while forgetting substantial learning can be attributed to other types of learning modes, including social impersonating and/or personal and cultural experiences⁴.

Education theory usually provides inferences on the purpose, application, and interpretation of human education and learning^{1,5}. In the broad sense, it comprises several numbers of theories that spanned across time, rather than a single explanation of how humans/adults learn, and how educators should teach. Rather, it can be related to numerous factors, including its theoretical perspective and epistemological position⁵. Therefore, it is important to recollect that there is no single common elucidation as to how humans learn and a consequential manual as to how the educators should practice the pedagogy. Therefore, having an understanding of the rationale behind different types of learning and teaching theories and their theoretical backgrounds will help university teachers to better cater to their diverse group of clientele, their 'students'.

Learning theory defines how students engage, progress, and recollect knowledge throughout the learning process⁶. This encompasses cognitive, emotional, and environmental influences, along with preceding experiences in life, as to how individuals perceive and then interpret and view the world within and around them. Advocates of behavioral theory often ponder on learning as a part of the conditioning and reassuring system of rewards and targets in education. But proponents of cognitive theory believe the learning process has a narrow chance of changing one's behavior but rather focus should be on learners' interaction with their environment or surroundings. Also, this type of cognition is more inclined towards and related to the intricacies of human memory.

Theorists who support constructivism, principally rely on that learners learn from what they already know and understand, and the knowledge gain and reception should be unique to each learner indicating a more personalized form of education accounting for individual needs. Finally, transformative learning theorists' weighs in on that learners learn through necessary changes that catalyst presumptions and the learning view of the world that can aid the learning process. In the meantime, contexts and environmental influences that outline the learning process is the foundation of geographical learning theory. In a nutshell, though different theories advocate different components of the learning theory, all of these have been valuable in understanding and improving the current practices in modern-day teaching and learning.

Currently, we understand that the university entrance is open for a large number of students, and this student multitude is comprised of a myriad of socioeconomic, educational, and attitudinal backdrops. The diversity of the learner can be largely connected to ethnicity, economic background, and gender, primary and secondary education, and family background, and his or her upbringing; however, there are other issues of diversity such as individuals who are differently-abled with visual or auditory impairments or the dispositions of learner that can affect learning, perhaps due to certain

learning disabilities, that might not get appropriate attention from the educational authorities⁷. Hence, it is imperative and crucial to acknowledge the diversity of the learner and to provide the proper recognition that each student deserves. This is important in a time where more and more students are enrolling in higher education around the globe leading to a 'massification' of higher education⁸. These amassing student numbers have created a more diverse yet unique student population enrolling in universities and higher education institutes, making a theory such as Howard Gardener's Multiple Intelligences (MI) particularly expedient and applicable as an inclusive pedagogy in the university system. In my belief, teaching and learning in the majority of educational institutions still faithful to archaic and conservative methods and techniques of teaching and evaluation do not always acknowledge the societal, cultural, ethnic, and gender differences of students to flourish. Given this backdrop, this paper will briefly implore Howard Gardener's MI as an all-encompassing pedagogy that could appraise current teaching/learning in higher education and its applicability to the ever-evolving and growing university system.

Howard Gardener's MI Theory

Gardner was an esteemed alumnus of Harvard University who later chose his path to become a professor at the same premise. He earned his doctorate in the field of developmental psychology and has contributed to a plethora of published literature on the MI theory and other educational topics. Gardner conceived his ideas of MI in the early eighties and was first proposed in his publication of 'Frames of Mind'⁹. He theorized that we learn in different ways that are independent of each other. But Gardners' theory contradicted the conventional intelligence theories of that time as standard intelligence theory advocates the human intelligence is always correlated. He confronted the orthodox view of intelligence and debated that several intelligences can coexist and proposed that seven distinct "intelligence" resides and coexist in the human brain. In broad terms, he identified these intelligences as a 'biopsychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture'¹⁰. He also explicitly stated that these intelligences cannot be counted or seen but rather coexist simultaneously. In the meantime, he argued that some of these 'intelligences' might not be visible or activated depending on the circumstance an individual would go through such as his or her background, the culture, opportunities, and constraints presented in the culture, and personal decisions made and influences from their families or surroundings. He also pointed out that the primary education or the school setup and teachers involved can play a vital part in awakening one's intelligence or not. Though Gardner's theory was originated in the field of psychology as he was trained as a psychologist, it

gained much attention in the education field and was considered somewhat controversial and revolutionary at that time.

Gardner's original seven intelligences included the following domains:

- Linguistic intelligence denotes the ability to use language/s, understanding, and comprehending various languages and the use of it.
- Logical/mathematical intelligence deals with problem-solving skills, carrying out mathematical processes, and scientific thinking.
- Musical intelligence recognizes non-verbal sounds in the environment, perform and create melodies, and is good with instruments.
- Visual/spatial intelligence deals with a strong understanding of the visual world and thrive best by visualizing and identifying and comprehending patterns in a visual backdrop.
- Bodily/kinesthetic, this intelligence effectively uses the whole body or body parts, maintain good hand-eye coordination, good with tools, and use body parts to solve problems.
- Interpersonal, the intelligence that comprehends and relates well to other people, teamwork, and empathy.
- Intrapersonal intelligence identifies with self-motivation, is conscious of own motives and feelings, and in tune with one's feelings, emotions and uses them to guide and regulate the mind and soul.
- Naturalistic is the intelligence that recognizes and recounts the natural world, good with patterns of identification, and observation and recognizes well with the surrounding environments (flora and fauna including) (Figure 1).

Gardner came up with a new and his eighth form of intelligence, later which was identified as "The Naturalist" and "The Spiritualist Intelligence" (Figure 1). The inkling behind this intelligence is the togetherness that an individual feels with nature and his or her environment. Some individuals tend to be more in accordance with their surroundings and learn from their environments and hence it was considered an important addition by Gardner¹¹.

In the bottom-line, Gardners' theory compartmentalize and divides basic human intelligence into specific 'modalities', rather than ascertaining or stereotyping a persons' intelligence is dominated by one generic ability. Even though these intelligences have been researched separately and thoroughly, Gardner disagrees with the idea of typecasting students to one form of intellect. According to his view, these intelligences are found in all people, however, in general, a person excels in only one or two. If university teachers can somehow determine or pay attention to these enhanced

abilities or the intelligences in each student and then by some means modifying the teaching to cater to these enhanced abilities or reflect upon their intelligences, the prospects that students will and might engage and learn better can be accomplished. Gardner saw his MI as a way to empower learners, but not to confine them to just one modality of learning, demonstrating the all-inclusive and all-encompassing nature of MI as a practice of pedagogy.

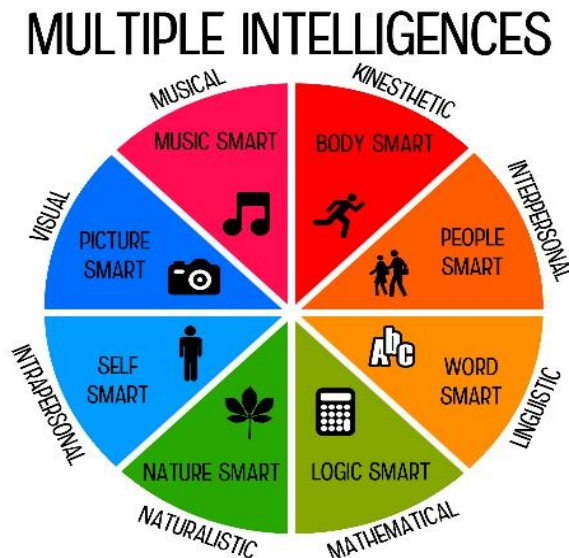


Figure 1: Intelligence Components of the MI Theory as Proposed by Howard Gardner

Source: Adapted from Howard Gardner's' MIs

The Use of MI in Today's University System

Nevertheless, the theory of MI was originated in the 1980s it has been used and practiced in primary and secondary schools around the world. But it was constantly debated regarding its appropriateness in higher education and its ability to elucidate the learning process in tertiary education, as its reception in higher education has been scarce due to lack of research. Though the MI was not well versed with higher education until quite recently, it has gained much attention in the field of education and much research has been carried out in school settings to evaluate the use of MI in primary and secondary education with respect to school children around the world including United States, Australia and different parts of Asia¹². At the same time, recently educationists started to revisit the MI with the increasing student population in higher education and vast differences in students representing different backgrounds and sociocultural bearings believing that Gardner's theory of MI can be a novel way to acknowledge

the diverse forms of intelligences. The repercussions of MI in the process of teaching/learning can be immense and therefore it would be unwise not to revisit these intelligences in the context of higher education.

Conventionally, most institutions that offer tertiary education are inclined naturally on just two forms of intelligences and mostly these are verbal/linguistic and logical/mathematical. Teachers usually focus on these two types of intelligences for teaching, assessment, and evaluation¹³. Campbell indicated, that educational programs that only focus on linguistic and mathematical intelligences can marginalize the other forms of intelligences such as visual, kinesthetic, interpersonal, etc. and inadvertently hamper and demotivate students who exhibit non-traditional modalities of intelligences. Thereby, such students are usually considered academically inept and their strengths mostly remain undiscovered and overlooked while pushing these students to the brink of low self-esteem and altogether wasting their talents in the university and the society at large¹⁴.

In the MI, teaching, and learning is considered an all-inclusive pedagogy as it values the vastness of intelligences and the use of these intelligences in the process of teaching, learning, and even in the student assessments. Such pedagogy would allow students to flourish and express their many skills and talents in formal education while not being sidelined by the traditional methods of teaching and learning. As pointed out in the recent literature with respect to modeling teaching and learning to cater to a diverse student population and rapid changes that occur in the education itself and subsequent world of work, we need students who can thrive under various situations who are equipped with, multiple intelligences. Autonomous learning is becoming a novel concept in education because of more adult students' involvement in finishing school and their tertiary education. A study conducted in Finland asserted that continuing education has been promoted to allow older students to come back to schools or universities to finish their education allowing them to be hired in various fields and get employed in competitive working environments¹⁵. This further affirms the importance of finishing school/university and the power of education and also it reflects that every student deserves such opportunities to be successful. Modern education moves forward from the traditional understanding of what is taught, to what students will learn or the ability to learn in a challenging environment, which is what MI thrives for. Salmi¹⁶ refers to this as 'methodological knowledge' which expresses that students should gain the skills and mindset to learn independently. But the caveat is that this 'methodological knowledge' cannot only be achieved in the classroom teaching and learning with only one or two forms of intelligences. A study conducted in Australia identified that a majority of students who're coming from non-English speaking backgrounds fail to understand classroom instruction when it is only conducted through formal lectures¹⁶.

Also, this could tie up to the phenomena of 'Intellectual Autonomy'. As rectors of higher education, we expect our graduates to be 'Intellectually Autonomous'. Intellectual autonomy is reflected by the ability to work independently and sustainably with a desire for challenges and growth through experience and is a major requirement for a graduate in the world of work. Although facilitating this level of emotional maturity is vital, it is often overlooked in the current education system. This has resulted in academically furnished, yet emotionally imbalanced graduates who fail in their immediate and subsequent careers. The process of transforming the entrée level-dependent mindset of a young university student to an independent graduate is multifaceted and warrants support. Hence, facilitating a conducive and holistic learning experience at the university level to enhance and sustain an effective learning environment and lifelong learning can be addressed through MI.

To do so, teachers have to understand and acknowledge that students have multiple ways of understanding and retaining the knowledge as well as the use of this knowledge outside the classroom. Hence teachers need to acknowledge that at least a couple of intelligences pointed out through Gardners' MI theory to be successful in today's' teaching and learning environment. Tertiary education has a much bigger responsibility to cater to the needs of the world of work and the necessary skills and tools can be provided by giving some thought to the interpersonal and intrapersonal intelligences, which are strongly related to skills needed in the workplace. But unfortunately, most of these other intelligences are rarely incorporated into the classroom/lecture room. Higher education in most countries has fallen short as they fail to address the all-inclusiveness into their programmes while turning a blind eye to the use of MI in the teaching and learning process. Still the prevailing normative assumption in many universities is to teach the traditional methods of knowledge acquisition using mainly verbal and mathematical intelligences.

In the traditional teaching setup, the teaching often takes place as a one-way dialog and often forgets that knowledge diffusion occurs in a two-way discourse. Again this has been the practice for a long time with the underlying assumption that students will mainly need to develop the verbal/linguistic and logical/ mathematical intelligence that allows them to succeed better in the state or international competitive examinations or purely focusing only on the graduating level GPA. This has been one of the mounting criticisms of the standard university teaching by students. We often hear constant criticisms made by students and graduates about the meager quality of assessments used; blatant lectures or uninteresting presentations used; too much 'lecturing' and not enough 'dialogue' with students; failure to encourage active, independent learning; unclearly specified aims, objectives and standards; and students not been involved in the active dialog

or not treated as partners in the teaching and learning process¹⁷. But on the contrary, there're some progressive lecturers or teachers who utilize out-of-the-box thinking and innovative teaching and learning strategies for their students. There are higher education institutes that are keen on utilizing experiential and experimental teaching and learning techniques. It seems that how progressive and experimental modern teaching and learning claim to be certain aspects of it has failed to fully reach the student or the learner.

In this scenario, MI can be of great use if revisited properly and adapted as an inclusive pedagogy catering to the needs of the learner. However, treating students as patrons or partners with the catering of improved teaching and learning environment that help students survive in the world of work will need different or rather novel approaches in the university. Curriculum revision, summative and formative assessment, and blended teaching informed by theories such as MI have the potential to fulfill some of these needs. A well-planned MI focusing more on the aforementioned interpersonal intelligence, in particular, allowing students to be actively engaged in collaborative and cooperative learning reinforcing many of the skills they will need in the workplace, and to mold them into intellectually autonomous graduates and subsequent employees in the workplace is needed.

Given this backdrop, MI can be a way to address the swift changes that universities and higher educational institutes endure in terms of a vastly diverse yet growing student population and the ever-challenging world of work. Thereby, the theory of MI could travel a long way connecting the missing pieces in higher education if incorporated correctly. It is of high time that educationists should revisit MI as a viable pedagogy for higher education.

Epilogue

Howard Gardner's theory of MI comes with its own merits and shortcomings, but based on whatever the little research has conducted over the years to decipher the use the MI in the field of higher education, educationists believe that it still has not gained its full momentum in the university education. MI has aided educators to question their conventional ways of teaching and experiment on diverse, unique, and multiple uses of intelligences forsaking the dominant ways of pedagogy allowing the educators to focus on all-inclusive teaching and learning. Hence, the overarching goal of this paper was to take a fresh look at the MI as a pedagogy that has great potential in higher education, where student diversity is becoming a prominent premise that needs much attention. Still, teaching and learning in universities are more inclined towards teacher-centered education and encourages only a narrow set of intelligences, overlooking the diverse abilities/skills and intelligences of students. Learning is not simply parroting out lectures yet it involves mutual

corporation, understanding, critical thinking, and above all the ability to solve problems and students can play a great role as equal partners in this process. These can only be inculcated through the education given by teachers to the students through progressive construction and with the effective use of varying abilities, skills, and intelligences accommodating a theory such as MI. In this regard, multiple intelligences are more likely to be contented and will help students expand their skills, their thinking, and use of different intelligences. This kind of learning will momentarily enhance the educational outcomes of students and ultimately will promote lifelong learning. It will help create more intellectually as well as emotionally balanced students who are more inclined to take upon the challenges in the world of work today and tomorrow.

*"Anything that is worth teaching can be presented in many different ways.
These multiple ways can make use of our multiple intelligences."*

Howard Gardner

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- ¹ Kyllonen, P. C. (2012). The importance of higher education and the role of noncognitive attributes in college success La importancia de la educación superior y el rol de los atributos no cognitivos en el éxito en dichas instituciones. *Pensamiento Educativo*, 49(2), 84-100.
 - ² Card, D. (1999). The Causal Effect of Education on Earnings. In O. Ashenfelter, & D. Card, *The Handbook of Labor Economics*, Vol. 3A (pp. 1801-1859). Amsterdam: North Holland (Elsevier).
 - ³ Ertmer, P. A., & Newby, T. J. (1993). Behaviorism, cognitivism, constructivism: Comparing critical features from an instructional design perspective. *Performance improvement quarterly*, 6(4), 50-72.
 - ⁴ University College Dublin. (n.d.). *Open Educational Resources of UCD Teaching and Learning*. Retrieved from http://www.ucdoer.ie/index.php/Education_Theory#:~:text=Education%20theory%20is%20the%20theory,and%20how%20we%20should%20teach.
 - ⁵ Bereiter, C. (1992). Referent-centred and problem-centred knowledge: Elements of an educational epistemology. *Interchange*, 23(4), 337-361.
 - ⁶ Ormrod, J. E. (1990). *Human learning: Principles, theories, and educational applications*. Columbus, OH: Merrill Publishing Co.
 - ⁷ Adcock, P. K. (2014). The longevity of multiple intelligence theory in education. *Delta Kappa Gamma Bulletin*, 80(4), 50.
 - ⁸ Akalu, G.A., (2016). Higher education 'massification' and challenges to the professoriate: Do academics' conceptions of quality matter? *Quality in Higher Education*, 22(3), 260-276.
 - ⁹ Gardner, H. (1993). *Frames of Mind: The Theory of Applied Multiple Intelligence*. London: HarperCollins.

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- ¹⁰ Gardner, H., (2011). The theory of multiple intelligences: As psychology, as education, as social science. Address delivered at José Cela University on October, 29, p.2011.
- ¹¹ Gardner, H.E., (2000). Intelligence reframed: Multiple intelligences for the 21st century. London: Hachette UK.
- ¹² Kezar, A. (2001). Theory of multiple intelligences: Implications for higher education. *Innovative Higher Education*, 26(2), 141-154.
- ¹³ Barrington*, E., (2004). Teaching to student diversity in higher education: How multiple intelligence theory can help. *Teaching in Higher Education*, 9(4), 421-434.
- ¹⁴ Campbell, L., Campbell, B., & Dickinson, D. (1996). *Teaching & learning through Multiple Intelligences*. Needham Heights: Allyn and Bacon, Simon and Schuster Education Group
- ¹⁵ Salmi, J. (2001). Tertiary education in the 21st century: Challenges and opportunities. *Higher Education Management*, 13(2), 105-128.
- ¹⁶ Mulligan, D., & Kirkpatrick, A. (2000). How much do they understand? Lectures, students and comprehension. *Higher Education Research & Development*, 19(3), 311-335.
- ¹⁷ Ramsden, P. (1998). Managing the effective university. *Higher Education Research & Development*, 17(3), 347-370.

CHAPTER 5

Self-Regulated Learning for Fieldwork Related Adult Learning-Teaching Interaction

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Introduction

Learning was defined in 1961, as a relatively permanent change in a behavioral tendency that occurs as a result of reinforced practice¹. This was recognized as an entity that cannot be assessed directly. But it was measured indirectly by the performances of the learner assuming that the relatively permanent behavioral pattern will be presented in the student's performances. With all these concepts, it still carries the doubt of what is exactly "learning" and how to learn effectively and fruitfully.

All the learning theories are broadly categorized into two: first, cognitive theories of learning (Gestalt psychologists' theory, Tolman's Sign-gestalt theory, and Lewin's field theory) and second. stimulus-response theories (concepts included in Thorndike's connectionism, Guthrie's contiguity theory, Hull's reinforcement theory, and Skinner's operant conditioning). After analyzing those theories, the connection made between these two broad categories can be identified as the motivation of the learner.

The concept called "Self-Regulated Learning" came into the discussion early in 1980' with a significant emphasis on the motivational aspect of the learner. Since then, the concept of self-regulated learning is one of the key interests of the researchers' in the field and it kept its momentum up-to-date. This concept was introduced by Zimmerman in 1986 as a basic model and with the collaboration of several other researchers in the field, further developments were carried out on this concept and ended up with several improved models day after the other. Self-regulated learning is a conceptual framework where the understanding of cognitive, motivational, and emotional aspects of learning come into play².

Fieldwork related learning and teaching is a key aspect and essential component in tertiary education since they almost always target to produce a professional as the final product. It is extremely difficult to set exact goals and timelines for fieldwork-related teaching-learning exercises as it is almost entirely dependent on the outside industry or institution which is not exactly

under the control of the teacher or the higher education institution. For example, clinical teaching and learning are totally dependent on the availability of the patients and their variations. That is nothing to do with the teacher or the learner. In other words, it is a time-bound matter. To some extent, that can be rectified by a self-motivated learner since the importance of this self-regulated learning concept with self-motivation comes into play in the fieldwork-related teaching-learning interface.

Self-Regulated Learning

Self-regulation is defined as the student's ability to behave according to their own intention in their own passion³. Self-regulated learning involves mainly the behavioral aspect of the learner. The motivation of the learner, his/her personal goals, and the individual limitations with behavioral patterns, will make a significant portion of this framework. At the same time, there is a cognition part which is known as metacognition. Metacognition also plays a significant role in this educational concept.

Metacognition is defined as the cognition over one's own cognition. This component of metacognition in self-regulated learning is referred to a self-reflection over student's own perception and intelligence related to their own learning, performances, and achievements. Once a student is trained to practice this method that would continue to be within the student and will lead to continuing professional development after achieving the desired primary goal. There are some models which describe these short-term and long-term goals with continuous development and lifelong learning⁴. Several models are described in the literature and a few main models are described in this text.

Zimmerman Models

The first well-defined model was described by Zimmerman in 1986, where he talked about a simple model called "Triadic Model of SLR" which described interconnected person's behavior and environment. Later, the same model was upgraded to a cyclical phases model which includes a further emphasizes on each of the components discussed in the initial model. In this cyclical model, it was redesigned into the performance phase, self-reflection phase, and forethought phase⁵.

In the forethought phase, the students set the goal and make the strategic plan with self-motivation, expecting a successful outcome. Then the student moves on to the performance phase where the student performs the task with time management, self-observations including metacognitive monitoring, and self-recording. Here, the student seeks help from the peers, or teachers, or near-peers. Finally, the cycle moves to the self-reflection phase where the students do self-judgment by evaluating themselves. They can satisfy themselves or they can be defensive or maybe adaptive

depending on the performance, the personality development of the individual and according to the set goals of the individual.

This cycle continues over and over again by setting short-term goals until they achieve the long-term ultimate goal. In this proposed model, the student is supposed to achieve the set goals by themselves after doing self-evaluation, self-reflection, and self-motivation.

Boekaerts' Dual Processing Model

Boekaerts had also published several findings in the field of self-regulated learning since 1988. She has looked at the situation-specific measures to evaluate motivation. Her latest model is the "Dual processing self-regulation model". In this model, the students can take either the growth pathway or wellbeing pathway according to their cognition over the task.

According to the described model, if the student perceives as the task is threatening for his/her wellbeing, emotions and cognition will move on the negative path. On such occasions, a student would try to protect the ego without damaging and would take the "wellbeing pathway". On the other hand, if the task is consistent with the student's goals and needs, that will trigger positive cognition and emotions. Such a student would take the growth pathway. Students can interchange the pathways depending on their success and their achievements depend on the pathway they take⁶.

Winne and Hadwin's Model of Self-Regulated Learning

In this model, there are four open phases connected with a feedback loop. Those four areas are; task definition where the student understands the task to be performed, setting and planning where the student sets goals and plans to get the task done, enacting study tactics and strategies, and at the end phase, metacognitively adapting studying⁷. There are another five facets described in the same four phases. Those five facets include a) Condition: available resources and constraints related to a particular task, b) Operations: tactics used by the students including, searching, monitoring, assembling, rehearsing and translating, c) Product: the new knowledge created, d) Evaluation: feedback by themselves, by peers or by teachers e) Standards: criteria of evaluation. All these phases and facets have cyclical connections and interconnections to achieve the set goal.

There are several tools developed to measure the traces of self-regulated learning using this model. "nStudy" and "gStudy" are two such computer-supported learning environments developed by Winne et al. Further he had emphasized the importance of "on-the-fly or "online" mode of self-regulated learning to create new approaches by using trace data.

Metacognitive and Affective Model of Self-Regulated Learning

Efklides has described the Metacognitive and Affective Model of Self-Regulated Learning in the year 2011. She has developed this model based

on the earlier models with a significant emphasis on metacognition⁸. This model has basic two levels as “Macro or Personal level” where the traditional concept is addressed and the “Micro or Task X Personal level”.

Macro-level is composed of, cognition, motivation, self-concept, affect, metacognitive knowledge, and metacognitive skills. This level is structured around the student’s goal towards the task and the student will act accordingly. Therefore, this level is “Top-down”. The second level is the “Bottom-Up”. Because it describes the task X personal aspect. There, the student’s characteristics will take the lead in decision making to accomplish the goal, where the metacognitive activities take control over the student’s activity. In this level, cognition, metacognition, affect and regulation of affect and effort come into play.

In this model, the first level where the “top-down” method is used is similar to earlier models such as the model described by the Zimmerman and the second level where the “bottom-up” method used is sharing similarities with the model described by Winne. In summary, this model describes the student’s performance during task execution involving metacognition, motivation, and affect with top-down/bottom-up implications.

Fieldwork Related Adult Learning and Teaching

It is believed that in any discipline or any level of education, field-related teaching with the actual implication coupled with the taught content in the classroom has a significant positive impact on the learner. In the tertiary education sector, teaching of professional subjects and especially in undergraduate teaching, fieldwork-related teaching is considered as an essential key component.

The alignment of the fieldwork, the amount to be taught during field teaching, the time spent in the field are different in different types of undergraduate courses, and in different disciplines. But the common phenomenon sheering is that the emotional, environmental, and behavioral aspects of field teaching and classroom teaching are entirely different entities. To deliver the content and to assess the content, there should be a clearly defined guideline which is also extremely difficult⁹.

It is believed that the fieldwork develops and motivates students into independent, life-long learners by opening their minds to all they can see, all they can hear, and all they can feel to learn something new, even in their immediate surroundings. This teaching-learning method is used in a wide range of disciplines including social sciences, environmental sciences, health sciences, and even business studies¹⁰.

Self-regulated Learning on Fieldwork Related Adult Learning-Teaching

The major limitation in the field related work is that the field is changing from moment to moment and the teacher or the learner doesn’t

have any control over it. Therefore, this self-motivated learner would find fair chances even within the confined space by moving out of the box with his or her desire to learn.

The goal of each day's session is set by the student. With the help of the teacher who is trained enough to guide a student to motivate the student on self-regulated learning. The required competencies will be gained by the students themselves. If the student is trained enough on self-regulation on his or her own teaching, he or she knows how to set goals. And with that goal, they will do self-assessment and learn their strengths and weaknesses by self-reflection. This cycle will continue and the student will find the ways and means how to accomplish the goal.

For an example, if a medical student is sent to a ward to learn about a disease condition and how is it presented, how is it treated, how do patients feel, and if there are no diseased patients in that ward at that particular time, the conventional field teaching will be failed at that point. But if the student is competent and trained in self-regulated learning, he or she would go there in his or her leisure time or may look for such patients in some other wards and will find such patients or would try to get peer support for the accomplishment of the set goal.

There is compelling evidence in the published literature that the self-regulated learning models especially the metacognitive aspect have a significant impact on adult learners towards effective learning¹¹. Therefore, this method would help in delivering effective teaching to adult learners in a fieldwork setting more effectively than conventional teaching where the environment is changing frequently. There were very few studies found in the literature on self-regulated learning and fieldwork related teaching^{12,13}. Those few studies also have concluded with an open ending as to have more studies for a conclusion. Therefore, new research and developments in this field would be essential and interesting.

Conclusion

Self-regulated learning is a well-defined method of motivational education in the emotional context. In fieldwork related teaching-learning exercise, this method would interact with the teacher and the learner to accomplish their goals in challenging settings. An adult learner would be a better candidate to be taught by using this method and challenging components of the course modules like fieldwork-related teaching would be delivered in a more convinced and productive manner.

¹ Aguado-Aguilar, L. (2001). Learning and memory. *Revista de Neurologia*, 32(4), 373–381. <https://doi.org/10.33588/rn.3204.2000154>

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- ² Panadero, E. (2017). A Review of Self-regulated Learning: Six Models and Four Directions for Research. *Frontiers in Psychology*, 8, 1–28. <https://doi.org/10.3389/fpsyg.2017.00422>
- ³ Kuhl, J. (1992). A Theory of Self-regulation: Action versus State Orientation, Self-discrimination, and Some Applications. *Applied Psychology*, 41(2), 97–129. <https://doi.org/10.1111/j.1464-0597.1992.tb00688.x>
- ⁴ Treasure-Jones, T., Dent-Spargo, R., & Dharmaratne, S. (2018). *How do students want their workplace-based feedback visualized in order to support self-regulated learning? Initial results & reflections from a co-design study in medical education*. In: Dimitrova, V, Praharaj, S, Fominykh, M and Drachsler, H, (eds.) CEUR Workshop Proceedings. 13th European Conference On Technology Enhanced Learning (EC-TEL 2018), 03-06 Sep 2018, Leeds, UK. CEUR Workshop Proceedings.
- ⁵ Zimmerman, B. J., & Moylan, A. R. (2009). Self-Regulation: Where Metacognition and Motivation Intersect. In *Handbook of Metacognition in Education*, 299–315. <https://psycnet.apa.org/record/2010-06038-016>
- ⁶ Boekaerts, M., & Cascallar, E. (2006). How Far Have We Moved Toward the Integration of Theory and Practice in Self-Regulation? *Educational Psychology Review*, 18(3), 199–210. <https://doi.org/10.1007/s10648-006-9013-4>
- ⁷ Greene, J. A., & Azevedo, R. (2007). A Theoretical Review of Winne and Hadwin's Model of Self-Regulated Learning: New Perspectives and Directions. *Review of Educational Research*, 77(3), 334–372. <https://doi.org/10.3102/003465430303953>
- ⁸ Efklides, A. (2011). Interactions of Metacognition with Motivation and Affect in Self-Regulated Learning: The MASRL Model. *Educational Psychologist*, 46 (1), 6–25.
- ⁹ Larkin, H., & Watchorn, V. (2012). Changes and challenges in higher education: What is the impact on fieldwork education? *Australian Occupational Therapy Journal*, 59(6), 463–466. <https://doi.org/10.1111/1440-1630.12002>
- ¹⁰ Gaipman, B., & Anthony, A. (1989). Contracting in Fieldwork Education: The Model of Self-Directed Learning. *Canadian Journal of Occupational Therapy*, 56(1), 10–14. <https://doi.org/10.1177/000841748905600102>
- ¹¹ Dignath, C., & Büttner, G. (2008). Components of fostering self-regulated learning among students. A meta-analysis on intervention studies at primary and secondary school level. *Metacognition and Learning*, 3(3), 231–264. <https://doi.org/10.1007/s11409-008-9029-x>
- ¹² Van Houten-Schat, M. A., Berkhout, J. J., van Dijk, N., Endedijk, M. D., Jaarsma, A. D. C., & Diemers, A. D. (2018). Self-regulated learning in the clinical context: a systematic review. *Medical Education*, 52(10), 1008–1015. <https://doi.org/10.1111/medu.13615>
- ¹³ Lourenco, D., & Ferreira, A. I. (2019). Self-regulated learning and training effectiveness. *International Journal of Training and Development*, 23(2), 117–134. <https://doi.org/10.1111/ijtd.12149>

CHAPTER 6

Producing an Efficient Graduate through Entrustable Professional Activities in Competency-Based Education Context

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Introduction

The changing advances of the modern world require a graduate who is empowered with the abilities to face the rising challenges of the world. The rapidly evolving job market of the world expects to recruit skillful and competent graduates in order to fill the current requirements of the employments. Therefore, the employers are looking for graduates not only with knowledge but also with the abilities to apply the knowledge into practice.

Unfortunately, most of the Sri Lankan graduates are perceived by the employers as insufficiently prepared for exhibiting the competencies and lack of professional behaviors when taking the responsibilities at the workplace. Most of the graduates fail to apply the theories learned in the university to professional practice.

This highlights the need for restructuring the higher education curriculum in order to meet the emerging needs of the employments in the modern world. Therefore, as academics, we are challenged in developing a graduate with the knowledge and skills who is capable of facing the novel changes and requirements of the modern world. The ways that the higher education system will foster and inspire a graduate compatible with modern world requirements is a multistep process that needs a holistic approach.

Since the undergraduates in the higher education system are adult learners and adult learning is distinct from child education, any change introducing to the higher education curriculum needs to have appropriate and realistic approaches to fit with the adult learning style.

The adults are oriented to learn from problem-centered learning rather than the subject-centered learning because they prefer the experience in real life as the basis for the learning activities. The adult learners need to be explained the rationale of the things they learn and their relevance and impact in their job or personnel life. Since their readiness to learn is also oriented to develop a task, instructions and the guidance provided during

teaching also need to be task-oriented and should allow them to discover things and knowledge for themselves¹. Therefore, the undergraduates' learning, needs to be interactive, learner-centered and the learner should be involved in the planning and evaluation of the learning process.

Considering all the above facts the traditional content-based, teacher-centered education has less value in the process of preparing an effective graduate empowered with the abilities to apply the knowledge into practice. Further, it will not provide an effective learning experience to an adult learner. Therefore, a realistic approach needs to be applied to enable the graduate to demonstrate knowledge and skills in the professional background.

Competency-Based Education (CBE)

Different educationists may have different approaches in developing a graduate with the required competencies and professional performance. In this context, CBE is one such commonly used approach which is compatible with the characteristics of the learning needs of the adults and organized to realize the aims of modern employer requirements. It provides effective learning by identifying the knowledge, skills, and attitudes required to perform as a professional.

Competency is defined as the ability, based on the integration of specific knowledge, skills, and attitude, to perform a professional task at a level sufficient for unsupervised practice.² and CBE is defined as an outcome-based approach to the design, implementation, assessment, and evaluation of an educational program using an organizing framework of competencies.³

Since the basis behind the CBE is to achieve the outcome, it provides standards about the learner's capabilities at the end of the course and allows the learners to determine how well they are progressing.

In traditional education models, all students start learning the required content and prepare for the examinations mostly by memorizing the taught contents. There is no synthesis of new knowledge, no analysis, or no application of the knowledge in practical situations. Therefore, most of the graduates fail or poorly perform whenever they apply their knowledge into practice. In contrast, CBE organized with clearly defined outcomes, enables them to master the required knowledge and skills. Other than this CBE promotes individualized learning while accommodating different diversities among individual learners. A CBE wherever properly organized could provide flexible, relevant, and holistic development to the learner.

Since the CBE is focused on the learner's achievements, the graduates are trained to work in real-life situations to become empowered with the abilities required by the employers. They later will become confident in taking responsibilities and working with a holistic approach when working with the given task.

Although there are many benefits of CBE, some limitations in the practical aspect have made it difficult to implement it into a curriculum. The competencies need to be translated and made manageable in terms of the tasks or activities. There should be proper selection co-ordination of required competencies to a particular curriculum. This highlights the need for a better link with competencies taught and trained at the university to the workplace situation.

Entrustable Professional Activities (EPAs)

The gap between the theory of CBE and practice is bridged by, the concept of 'Entrustable Professional Activities (EPAs)⁴. It is a new concept which is currently being adopted by many educationists to translate competencies into observable and measurable tasks. EPA is defined as a key task of a discipline (i.e. specialty or subspecialty) that an individual can be trusted to perform in a given context, once sufficient competence has been demonstrated⁵. Thus EPAs are a common approach to CBE.⁶

An individual must develop the necessary competencies relevant to a particular EPA, and he or she must apply those competencies in an integrated manner to the activity at hand in order to be entrusted⁷.

Benefits of EPAs

EPA framework is becoming popular among many educationists due to its number of benefits to both the learner and the teacher.

Since EPA is a unit which describes a set of tasks or responsibilities performed in the working environment without direct supervision, practicing EPAs at the undergraduate level is an important opportunity for undergraduates to develop a new construct toward preparedness to perform as effective professional.

EPAs also allow the learner to get a clear idea about the set of skills and abilities he or she needs to master at each stage of the learning process.

Assessing the undergraduates throughout the university education is an essential part of higher education. When having a CBE, the competencies achieved by the students need to be assessed. The EPA framework makes the assessment of competencies transparent and more practical by allowing both the learner and teacher to identify the abilities and achievements of individual undergraduates at different stages of the learning process. In addition to that, it helps to identify the gaps in those abilities and to pinpoint a learner, the areas which need improvement while making the academics enable to provide proper guidance to learners to take necessary actions to fill the identified gaps at the relevant stage of learning.

Further, it allows educators to take a holistic approach to the assessment of competencies in a coordinated manner and situate competencies in the real-life working context. EPA framework also provides a feedback on necessary revisions that need to be made in the curriculum

and provide better standards for assessment methods for the undergraduates. Ultimately EPAs help to produce a graduate competent on their knowledge and skill to perform well in the workplace.

Designing a Curriculum Consists of EPAs

Considering the number of benefits of EPAs, most of the educationists tend to implement them into the curriculum. But designing a curriculum based on EPAs may be challenging as it is a novel concept with fewer experts on the subject. However, attempting to implement them into a curriculum is encouraged as the problems will be identified and addressed then only.

The undergraduate curricula can be structured along with a range of EPAs that a learner must have mastered when the training is completed. These EPAs can be linked to an organizing competency-framework by pointing out which specific domains of competence are considered most relevant for each EPA.

Three broad areas should be considered when building an individual workplace curriculum around EPAs.

- How to select the EPAs for the particular course?
- How to describe EPAs for training and assessment?
- How to plan the teaching-learning process and assessment in a well-structured manner⁸?

How to Select an EPA?

Selecting the suitable EPAs for a particular curriculum requires a thoughtful process. The selected EPAs should have valid coverage of all the domains of competence. EPAs should also create a base for observation and assessment of competencies.

Therefore, the curriculum builders need to identify the important tasks that graduates need to be mastered according to the current needs of the country, industry, or the particular field, before selecting the EPAs. Discussions and workshops with teachers, students, and experts will be helpful to achieve that. The steps of selecting the suitable EPAs for a curriculum are as follows;

Evaluate the Current Curriculum

The current curriculum and the already set aims, objectives, and learning outcomes need to be evaluated in such a way to identify the possible EPAs and expected types of competencies that can be covered by a particular EPA.

Streamlining the Curriculum

The curriculum needs to be streamlined to identify the gaps and overlaps, and to priorities the selected EPAs in proper order. This will

support to identify the necessary modifications needed to be done in the selected EPAs.

Conduct Graduate and Employer Surveys

The feedback from the graduates who are currently working in the field are important to identify the new and specific demands of the workplace. These will also highlight the deficiencies of those graduates and highlights the areas in the current curriculum that need further improvement. This also aids the academics to develop program priorities based on the identified requirements.

How to Describe an EPA?

After selecting the suitable EPAs, a full description needs to be given for each and every EPA. Because each EPA should give a clear idea of expected outcomes and required knowledge and skills. So, a full description of EPA should include sections as follows;

Title and a Short Description about the EPA

A suitable title that describes the expected entrustable activity, needs to be given to each EPA. This should be an activity given in the form of a noun or a verb. E.g.-Care for a diabetic patient, perform a lumbar puncture, obtain consent for the surgical procedure, etc. Then a short description about the title and intended learning outcomes need to be given for the student to understand what is expected to achieve through the particular EPA. E.g.-The short description for the EPA, "Care for the diabetic patient" would be "The purpose of this EPA is to achieve the ability to manage a patient with diabetes mellitus without direct supervision. Through this EPA, the student is expected to be able to diagnose diabetes mellitus, plan the care of diabetic patients at the time of diagnosis of the disease until the discharge from the hospital, selecting and request the relevant investigations applicable for the patient, recognize the complications of the disease, communicating with the patient and his or her family, arrange the necessary referrals to the professionals who may involve in the long term management of the patient".

Required Knowledge and Skills⁹

Specific knowledge and skills necessary to perform a particular EPA should be described in detail. This may include a list of tasks, sources of information, and reference materials and also the required soft skills like communication skills, leadership, teamwork, etc. E.g.-For the EPA, "Care for the diabetic patient", the required knowledge and skills are; knowledge of the anatomy of the pancreas and its function, knowledge on the synthesis of insulin and its regulation, knowledge on the pathophysiology of diabetes mellitus, knowledge on symptoms and signs of the disease and its complications, knowledge on pharmacological management of diabetes

mellitus, skills to deal with para-clinical staff to get their support, ability to get relevant history and perform the relevant examination, ability to communicate with specialists and health care providers to arrange eye care, dietary advice and wound care, ability to explain the disease and its long term management to the patient and family.

The Integrated Competencies in the EPA

Each EPA consists of multiple competencies. Therefore, the competencies relevant to a particular EPA need to be listed. When selecting the competencies to integrate into a particular EPA, balanced attention needs to be paid to identify all relevant domains of competencies with proper co-ordination and organization of them. E.g.-When the EPA is, "Care for the diabetic patient" the student is expected to be competent in knowledge on diabetes mellitus, communication with the patient, and being professional when dealing with the patient. Therefore, competencies integrated into this EPA are medical knowledge, interpersonal and communication skills, professionalism, health advocacy, and patient care.

Assessment Method

After implementing EPAs into a curriculum, a proper assessment method is required to assess how well the student is performing an EPA while achieving the required knowledge and skills. There, a time frame needs to be given to achieve a particular EPA and the students need to be informed when and how their performance will be assessed. E.g.- When the EPA is "Care for the diabetic patient", the mastered skills and knowledge will be assessed by conducting assessments like; observed history taking and physical examination in front of a panel of experts, objective specific viva with patient education interview. An essay question paper where the student is expected to fill in an investigation form, write a drug prescription, write a referral letter to retinopathy screening.

How to Plan the Teaching-learning Process and Assessment in a Well-Structured Manner?

Proper scheduling and organizing of the EPAs at different levels of the teaching-learning process should be done for the sustainable success of the process. Starting with a simple EPA initially and gradually moving into more complex EPAs is advisable.

The workshops and training programs need to be arranged for the academics who are going to supervise and guide the students. The academics should be clear and aware of 'the concept of EPAs' and the ways of guiding the students to achieve the expected outcomes in the curriculum.

Since EPAs enable the academic to assess the learner's achievement at different stages of the undergraduate carrier on regular basis in an

integrated and organized manner, by observing the performance of EPAs, the learner must be provided with feedback on his/her individual performance. This will aid the learner to identify his/her progress and the gaps and weaknesses which need further improvement.

The final assessment of each EPA should give a comprehensive image of a trainee's competence in a particular EPA. There the EPAs need to be reviewed by a committee consists of multiple observers who are experts in that particular field. They will provide the entrustment decision to each EPA as "the student is entrusted to perform the professional activity without direct supervision", if the student is performing to the expected level. If the student's performance is below the expected level the decision would be given as "the student is not entrusted to perform the professional activity without direct supervision." which means that the student is not competent enough to bear a responsibility and need some further improvement. Therefore, the academics need to be trained to take the entrustment decisions and the student must be made aware of how the EPAs are assessed.

However, after planning the teaching-learning process and the assessment methods the curriculum needs to be reviewed and revised based on the students' and teachers' feedbacks, new research findings and experts' opinions. Therefore, to ensure the sustainability of the program, feedbacks must be taken on a regular basis, annual program reviews and progress interviews must be conducted and the researches on this field need to be encouraged to find out the flexible and suitable methods to implement.

Examples of EPAs Implemented Curricula in Different Fields

Although this is a novel concept, many educationists have attempted to implement this concept into their curricula. The educationists from different fields have identified core EPAs relevant to their subject. The core EPAs are broad topics that give a summary guide to build up EPAs. Therefore, these core EPAs can be used as a framework to develop the EPAs.

Englander et al have identified 13 core EPAs for undergraduates in the field of medicine. They are; gather history and perform a physical examination, prioritize a differential diagnosis following a clinical encounter, recommend and interpret common diagnostic and screening tests, enter and discuss orders/prescriptions, obtain informed consent for tests and/or procedures, document a clinical encounter in the patient record, provide an oral presentation of a clinical encounter, form clinical questions and retrieve evidence to advance patient care, give or receive a patient handover to transition care responsibility, collaborate as a member of an interprofessional team, recognize a patient requiring urgent or emergent care and initiate evaluation and management, perform general procedures of a physician, identify system failures and contribute to a culture of safety and improvement¹⁰.

Haines et al describe the EPAs for pharmacy graduates. Some of them are; collect information to identify a patient's medication-related problems and health-related needs, analyze information to determine the effects of medication therapy, identify medication-related problems, and prioritize health-related needs, establish patient-centered goals and create a care plan for a patient in collaboration with the patient, caregiver(s), and other health professionals, and that is evidence-based and cost-effective, etc.¹¹.

Limitations of EPA Concept

Since it is a new concept there are some limitations to the EPA concept. Still, there are fewer experts in this field and having minimal data regarding the concept. Implementing EPA into the undergraduate curriculum may be time-consuming and some difficulties may arise in synchronizing EPA with the current curriculum and common assessment methods conducted currently in the universities. However, these issues can be addressed with time and better implementation would be enabled.

Enhancing Learner Engagement and Experience through EPA

As academics, our final target is to enhance the learning in higher education in an effective manner to produce a graduate who is able to serve the community with value. The EPA concept allows to acknowledge the graduates' attained competence for specific responsibilities. This concept might be a turning point for restructuring the higher education curricula with more learner engagement and providing an interactive experience to the learner. Therefore, proper implementation of the EPAs to the curriculum will enable to produce an effective and competent graduate to perform well while taking responsibilities in their professions. Selecting suitable EPAs, proper evaluation of selected EPAs with expert's opinions, and having feedback from the students and teachers will lead to a sustainable success of this novel concept in the context of Competency-Based Education.

¹ Knowles, M. (1984). *The Adult Learner: A Neglected Species 3rd ed.* Houston: Gulf Publishing Company.

² Ten Cate O, Snell, L., & Carraccio, C. (2010). Medical competence: the interplay between individual ability and the health care environment. *Medical Teacher*, 32(8), 669-675.

³ Frank JR, Snell LS, Ten Cate O, Holmboe E, Carraccio C, Swing S, Harris P, Glasgow NJ, Campbell C, Dath D, et al. (2010). Competency-based medical education: Theory to practice. *Med Teacher*, 32(8), 638–645.

⁴ Ten Cate, O., Scheele, F. (2007). Competency-based postgraduate training: Can we bridge the gap between theory and clinical practice? *Academic Medicine*, 82(6), 542–547.

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- ⁵ Ten Cate, O. (2005). Entrustability of professional activities and competency-based training. *Medical education*, 39, 1176-1177.
- ⁶ Cheat Sheet <http://www.royalcollege.ca/rcsite/documents/cbd/cbd-cheat-sheet-e.pdf>
- ⁷ Lomis, K., Amiel, J. M., Ryan, M. S., Esposito, K., Green, M., Stagnaro-Green, A., ... & Mejicano, G. C. (2017). Implementing an entrustable professional activities framework in undergraduate medical education: early lessons from the AAMC core entrustable professional activities for entering residency pilot. *Academic Medicine*, 92(6), 765-770.
- ⁸ Mulder, H., Cate, O. T., Daalder, R., & Berkvens, J. (2010). Building a competency-based workplace curriculum around entrustable professional activities: The case of physician assistant training. *Medical teacher*, 32(10), e453-e459. DOI: 10.3109/0142159X.2010.513719
- ⁹ Mulder, H., Cate, O. T., Daalder, R., & Berkvens, J. (2010). Building a competency-based workplace curriculum around entrustable professional activities: The case of physician assistant training. *Medical teacher*, 32(10), e453-e459. DOI: 10.3109/0142159X.2010.513719
- ¹⁰ Englander R, Aschenbrener C.A., Call, S.A. Core entrustable professional activities for entering residency. MedEdPORTAL. 2014. <https://www.mededportal.org/ collaborative/ resource/887>. Accessed November 9, 2016.
- ¹¹ Haines, S. T., Pittenger, A. L., Stolte, S. K., Plaza, C. M., Gleason, B. L., Kantorovich, A., ... & Masuda, Q. N. (2017). Core entrustable professional activities for new pharmacy graduates. *American Journal of Pharmaceutical Education*, 81(1), S2.

CHAPTER 7

Enhancing Learner Engagement and Experience by Developing Research Skills at the Undergraduate Level

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“Education is the most powerful weapon which you can use to change the world” – Nelson Mandela

Introduction

Education is an essential part of human life. To live a successful life, early childhood education and higher education have become very important. Education provides individual freedom and empowerment while yielding series of important benefits. It is a powerful tool, which can be used to change human life by changing the economy of the country. Higher education plays a key role in education and it shapes the values and norms of a society and creates the space for enlightening citizenship and democracy. It is universally recognized that the major functions of a higher education institute are the creation and advancement of knowledge as a product of teaching, research, community services, and national services. Research is considered as an important parameter in higher education. The word research comes up with several definitions. Followings are some of them.

“Research is defined as the creation of new knowledge and/or the use of existing knowledge in a new and creative way so as to generate new concepts, methodologies, and understandings. This could include synthesis and analysis of previous research to the extent that it leads to new and creative outcomes¹.”

“Investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws²”.

Developing and deploying adequate research and innovative resources are also the most important part of economic development and long-term growth in the country. For that, undergraduate researches give a valuable contribution. The undergraduate level is the first entry-level of tertiary education in Sri Lanka. In addition, it is the first entry-level of students

who can take part in hands-on experience, investigations, research projects, and inquiry-based learning³.

Research can be motivated in different phases of university studies. Traditionally, research has been a task for graduate studies, but nowadays it is also being introduced early in undergraduate programs. It helps students to easily understand theories that they need to learn and learn innovative things with having practical knowledge. Undergraduate students are always curious about learning new things. Every time they think “what is the importance of learning these, in what places we can apply them, what we can do to improve them further, how we can apply these things in new innovations” etc. If the students feel that the content they are learning is not much useful, then they take a step back to learn them. Therefore, in this article, it is argued that encouraging undergraduates in doing research can be used to enhance learner engagement and experiences.

Why is Research Helpful to Students?

As mentioned earlier, students are very curious persons. Therefore, when we include research, small projects, or practices into course modules or curricula, they try to inquire about the contents that they have to learn rather than rejecting them. In addition, doing a research can be helpful to students as follows.

- It teaches students to gather evidence that is previously said and done prior to make decisions. Also, it practices students to consider alternatives to take the best decision.
- It teaches students to apply all theoretical knowledge into practice.
- During the research, students can learn how to identify the weaknesses and strengths of those arguments or events.

Types of Research

Research is a process of careful inquiry, thoroughly examining and analyzing the situational factors surrounding a given problem leading to the discovery of a solution or alternative solutions to it. By considering these things, research can be basically classified into two types. They are pure research and applied research.

Pure research is created from human knowledge by applying theories and concepts. It is also based on experimentation and observations. Applied research is about getting some ideas and techniques from pure research and serving a specific real-world goal. Besides the above two types, there are further classifications for research⁴.

- Descriptive research
- Analytical research
- Qualitative research
- Quantitative research

- Conceptual research
- Empirical research

Difference between Various Types of Research

Scientific research involves a systematic process that focuses on being objective and collecting information for analysis so that researcher can finally come to a conclusion. Figure 1 describes the different types of research and the variety of them.

Difference between various research types	
Applied vs. Basic	
Applied research works by finding a solution for an immediate problem. These problems are faced by society or by industry	Basic research is concerned with the formulation of a theory. It is an add on to the already existing scientific knowledge.
Descriptive vs. Analytical	
Descriptive research leads to ideas and helps in defining the problem	Analytical research never gives the final answers to research questions. But it explores the research topic on different levels.
Qualitative vs. Quantitative	
Quantitative research is the measurement of quantity. It is applicable to the things, which can be measured in terms of quantity.	Qualitative research is based on quality. Something related to quality or kind. For example, when we investigate the human behaviour.
Conceptual vs. Empirical	
Conceptual research is that related to some abstract ideas or theory. It is generally used by philosophers and thinkers to develop new concepts	Empirical research relies an experience or observation alone, often without due regard for system and theory. It is data based, research, coming up with conclusions.

Figure 1: Difference between Various Types of Research
(Susan White, 2019)

Essential Steps in the Research Process

- Define the problem

Select the research problem due to professional and personal interests in the area. Here, the researcher needs to focus on novelty, utility, risk, etc.

- Review the literature

The literature review is the longest stage in the research process. It is also very important since in this process, the researcher must check if the same research problem has been addressed before in the same context.

Besides that, the researcher can familiarize himself with the research problem.

- Select a research design

Select several data collection methods from literature reviews and analyze the advantages and disadvantages of those methods. Then own research design can be developed by considering them.

- Formulate a hypothesis

Consider what do the researcher intends to test and what are the relationships among the variables.

- Carry out the research

Collect data regarding the research. Then follow the same procedure and repeat the methodology.

- Interpret the results

Analysis of data plays an important role in the achievement of research aim and objectives. Therefore, interpretations of the results have to be done by using collected data and information. Then the discussion based on the research findings should be done with the wider academic community and finalized it.

- Report the research findings

Write down the research problem and findings. In addition, write about the significance of the research and how it differs or relate to previous findings.

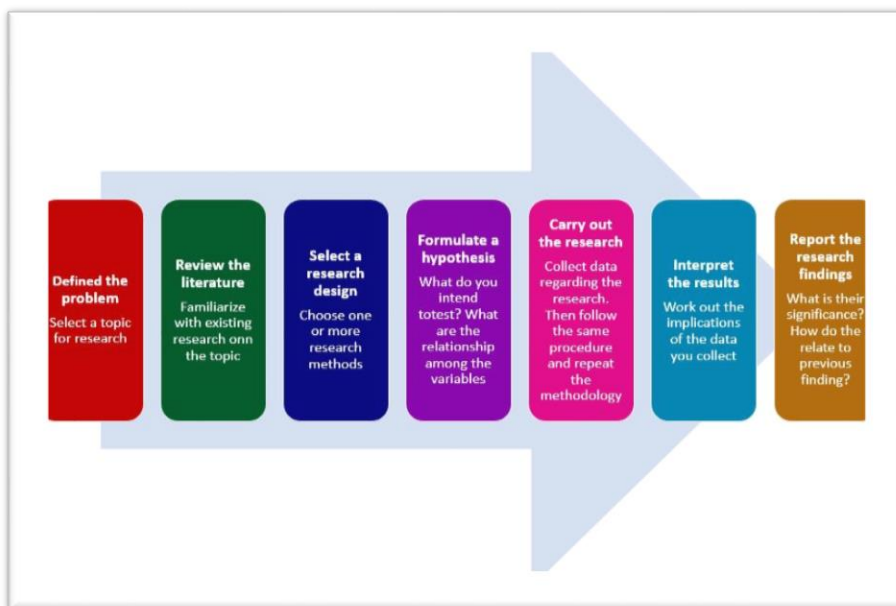


Figure 2: Essential Steps in the Research Process
(<https://www.researchomatic.com/Research-Process-60167.html>)

What Are the Research Skills, Students Can Receive by Doing Research?

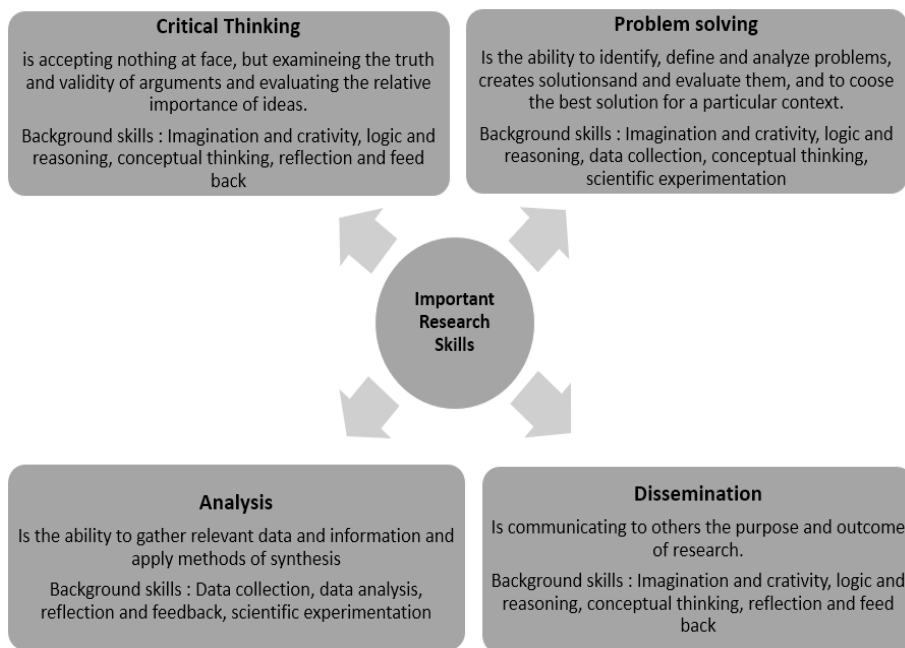


Figure 3: Some Important Research Skills

To produce qualified graduates for the world, universities should actively involve with research activities. For that, teachers should include research skills at the undergraduate level to get their contribution to research activities. If students effectively engage with research activities, students will become producers, not just consumers of knowledge.

There are four main ways of engaging undergraduates with research activities⁵.

- Research-led: Learning about current research in the discipline
- Research-oriented: Developing research skills and techniques
- Research-based: Undertaking research and inquiry
- Research-tutored: Engaging in research discussions

If we include these four ways of engaging students into the curricular then students' engagement and experiences can be improved because students always like to learn through experiences. From that, their knowledge and thinking power are also increased.

Bloom's taxonomy is the systematic classification of learning objectives within education and it is a widely accepted framework for a learning community. It can be applied to any cognitive content intended for students to learn. When we consider Bloom's taxonomy on the part of teachers, a practical tool that can be used to create a good lesson plan to

ensure students' progress is maximized⁶. Figure 5 is the new version of Bloom's taxonomy. It has a very close relationship with the research process.

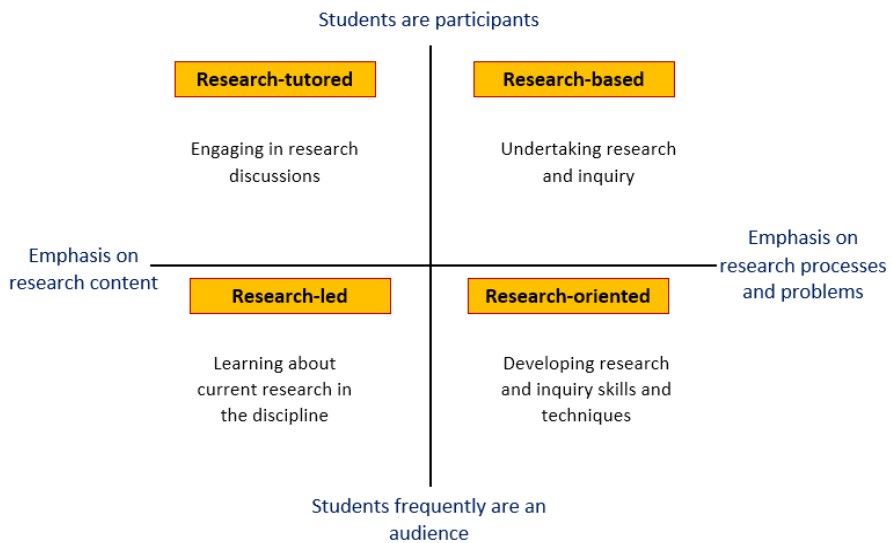


Figure 4: The nature of Undergraduate Research and Inquiry (Healey and Jenkins 2009)

Research skill improves students' ability of remembering, understanding, applying, analyzing, evaluating, and creating (New Bloom's taxonomy). Therefore, improving the research skills of students covers the learning objectives of Bloom's taxonomy.

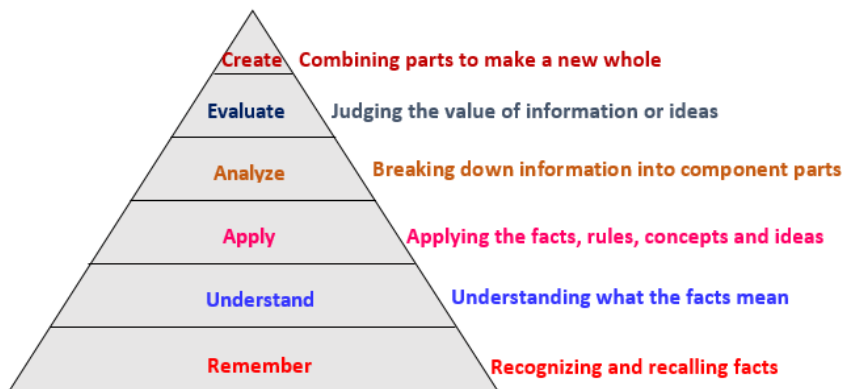


Figure 5: New Version of Bloom's Taxonomy

Approaches to be Taken as an Effective Teacher

As explained before, the research is the most important part of higher education for undergraduates. Teachers have to play the main role to

enhance learner engagement. There are some qualities of an effective teacher⁷.

- Patient, caring, and kind personality
- Dedication to teaching
- The ability to develop a relationship with their students
- The ability to motivate the students

The teacher with the above qualities can improve the students' qualities of listening, negotiating, persuading effectively, and evaluating the arguments in making a correct decision.

Now, in the university system, research projects are already included in the curriculum. In most of the universities in Sri Lanka, a research project is included at level four. However, it is difficult to obtain a good outcome from a research within one year since students also have an academic workload. Therefore, as academics, if we can form the foundation for the final year research project from level two onwards, it will be advantageous. Then, the students will have more time to complete their tasks, and introducing these things at early levels will increase their excitement and interest and motivate them to search for new things. It is involved with the discovery of excellent novel things. Therefore, as academics, teachers have to guide students to find details about their research and supervise them.

"Supervision is an intensive form of teaching, in a much boarder sense than just information transfer". It involves the fundamentals of effective teaching. Among them supervisors do motivation of students, concern them, and guide them to their progress and completion of the degree⁸. After appointing supervisors for the students, they will start the literature survey for their project. Then students will start to learn more theories and procedures related to their research and also, focus on their studies since when they start the research study, they will become more familiar with almost all the subjects that are needed for a good invention. After implementing this process, students tend to meet their supervisors frequently and discuss about the research. Here, supervisors need to create and maintain good relationships with the students. Therefore, by applying this process, we can increase learner engagement and experiences at the undergraduate level. Accordingly, well-qualified graduates can be produced from the universities. Also, they can actively engage in the economic development of the country.

¹ Definition of Research | Western Sydney University. (n.d.). Retrieved May 8, 2020, from https://www.westernsydney.edu.au/research/researchers/ preparing_a_grant_application/dest_definition_of_research

² Research. (n.d.-a). Retrieved May 8, 2020, from <https://www.merriam-webster.com/dictionary/research?src=search-dict-box>

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- ³ Brew, A. (2003). Teaching and research: New relationships and their implications for inquiry-based teaching and learning in higher education. *Higher Education Research & Development*, 22(1), 3-18
- ⁴ Kumar, R. (2008). Research methodology: An introduction
- ⁵ Healey, M., & Jenkins, A. (2009). *Developing undergraduate research and inquiry* (p. 152). York: Higher Education Academy
- ⁶ Adams, N. E. (2015). Bloom's taxonomy of cognitive learning objectives. *Journal of the Medical Library Association: JMLA*, 103(3), 152-153
- ⁷ Lupascu, A. R., Pânisoară, G., & Pânisoară, I. O. (2014). Characteristics of effective teacher. *Procedia-Social and Behavioral Sciences*, 127, 534-538
- ⁸ Fry, H., Ketteridge, S., & Marshall, S. (2003). Understanding student learning. In H. Fry, S. Ketteridge, & S. Marshall, A handbook for teaching and learning in higher education: Enhancing academic (pp. 8-26). New York: Routledge.

CHAPTER 8

Switching Roles: Enhancing Learner Engagement and Experience in Higher Education

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Introduction

The term “adult” implies not only the age but maturity and understanding. Adult learners are participants in adult learning opportunities¹. Their aspects of learning are different from learners in schools. Autonomy, goal-oriented, learning by experiences, and being responsible for self are some of the characteristics of adult learners². Thus, the learning environment of higher education has to be designed to accommodate these qualities of the adult learner.

This article was inspired by an experimental learning environment which was designed for the third year acting students of the Department of the Drama, Oriental Ballet and Contemporary Dance, University of the Visual and Performing Arts (UVPA), Colombo. This group of actors was losing their interest in learning, self-esteem, and distanced from teaching activities due to an unexpected circumstance in their batch. My challenge was to teach acting theories which is normally a teacher-centered learning activity. To develop their engagement in learning, I wanted to try out a different learning environment with a new innovative method of teaching theories. Hence, I allowed them to take the responsibility of performing the role of a teacher, by switching my role as a teacher. I observed some of the changes in their behavior and attitudes with the receiving of leadership, challenge, and responsibility.

With this case study, this article discusses the assumptions of adult learning and student-centered learning (SCL) in understanding the quality of an adult learner and adult learning. Further, it argues that the learning environment for adult learners should be aligned with the aspects and the characteristics of adult learners to develop their interest in learning. Finally, this article assumes that switching the leadership and the responsibility of teaching with learners has a great impact on developing learner engagement and experience in higher education.

Andragogy Vs Pedagogy

Moving back to the origins of the philosophy of education, Plato can be identified as the first philosopher of education. According to Plato, education is all about finding good. The main focus of teaching and learning in the Athenian state was to create a virtues citizen for the 'benefit of the community not for personal development'³. The education in the Athenian era was a pedagogical approach to teaching.

Teacher-centered learning (TCL) is the old fashion of teaching where speaking and listening become the mode of teaching and learning. This approach of learning is a memory task and learners become passive receivers of information. 'Knowles, Holton, and Swanson posit that since adults learn differently from children, a different kind of education is required. In contrast with pedagogy, where orientation to learning is subject-centered, adult learning theory is based on the assumption that an adult's orientation to learning is problem-centered, and adults learn best when new knowledge, skills, and attitude are presented in the context of real-life situations'⁴.

Melcome S. Knowels (1913 - 1997) who is considered as the major figure of informal adult education in the USA, uses the term *Andragogy* as the 'art and science' of adult learning⁵. It refers to any form of adult learning. 'The Greek, *aner* (genitive andros), means "man", while *agein* means "to lead"; so andragogy means "leading men," which can be paraphrased as "leading adults"⁶ (This refers to all genders). 'This paradigm of Andragogy has contributed to understanding adults as learners and it has addressed the assumptions of adult learning'⁷.

Characteristics of an Adult Learner

University Students between the ages of 20 - 35 are adult learners. Though they could be named as *Students*, university students are different from school students. The term *Adults* implies the idea of being mature through experiences collected within their lifetime. As an individual, they are stable in socially and culturally. They have their own perceptions upon society and they tend to believe their experience. With age, adults become more responsible for the relationship they have with society as socio-political and cultural beings. Thus, learning always becomes secondary. Their main aim of learning is to complete their responsibilities and duties for the society and to qualify themselves to accomplish their goals. They learn for the acquisition of success and results from what they learn.

Knowels has identified the following characteristics of an adult learner⁸.

1. Autonomous and self-directed

An adult learner is an independent individual. She/he has her own concept of directing herself/himself and eager to get more responsibility and leadership among a group.

2. Learning through life experiences

An adult learner is accumulated with knowledge, gained by living through her/his own life. Life experiences are the motivation for an adult learner to learn. Experiences are the resources of their knowledge. She/he prefers doing than listening and believes what they experienced by the act of doing.

3. Goal-oriented

Adult learner has her/his own path and plans for his/her life. She/he concerns about their goals when making decisions. Thus, she/he prefers to learn what could help to achieve their goals.

4. Relevancy-oriented

An adult is rational and logical. Thus she/he is seeking for reasons and relevance of learning.

5. Practical

An adult learner is problem-oriented and she/he needs to identify the applicability of certain learning in their objectives and goals.

6. Needed to be accepted and respected

An adult learner prefers to be respected. It develops her/his self-esteem and confidence. Being acknowledged and appreciated motivates her/him to learn.

Student-Centered Learning

Student-centered learning (SCL) is a famous term in higher education. 'SCL offers an umbrella term to describe efforts for students to become actively engaged in their learning and for teachers to design and facilitating and learning process'⁹. It is in contrast to teacher-centered learning (TCL) as it keeps the *student* in an active position than the teacher. This has been identified as the most effective teaching and learning model as it allows the student to direct her own learning. There are many terms related to SCL such as effective learning, collaborative learning, experiential learning, and problem-based learning. Though these terms have misconceptions and confusion, all these terms emphasize the features of SCL and 'centrality of the student's role in terms of practice, curriculum, and content'⁹.

Maryellen Weimer, the author of *Learner-Centered Teaching: Five key changes to practice*, introduces five specifications of SCL¹⁰. (Weimer uses Learner-centered learning for SCL and instructor-centered learning for TCL).

1. Balance of power in the classroom

In TCL, the teacher or the instructor has the power of the class. She is the one who designs curricular, prepares lesson plans, and assessments. The teacher maintains the authority of decision-making in the class. The teacher decides what students should learn and how

they should learn. SCL shifts this traditional position of authority of teaching, from teacher to students. It encourages the involvement of students in decision- making in learning. It doesn't suggest either teacher has no power or students get unlimited power in SCL, rather it democratizes the power of authority in teaching and learning. For instance, the teacher could provide students opportunities to make choices in their learning instead of directing them in a specific path. By this power shift, students gain experience functioning both as liaison and as a leader.

2. The function of the course content

Course content is the range of teaching and learning of a particular course. It manages the flow of the lessons and time. It is a misconception of thinking that a course could meet its aims and objectives by *covering* the course content accurately within the given period of time. *Covering* the content of the course is not the ultimate goal of teaching. It may produce students who have confidence in subject matters. Nonetheless, it doesn't engage in the development of a student's capacity for critical thinking and problem-solving. 'Weimer appeals to teachers to *use* the course content not just an end in itself, but as a means of helping students how to learn'. Thus, SCL proposes to use course content as a guide to producing a student empowered with knowledge, skills, attitudes, and mind-set (K-SAM).

3. The role of the teacher versus the role of the student

The root of the etymology of the term lecturer is originated from the Old French or from Medieval Latin verb *Lectura* which denotes reading or to choose. Thus, the term lecturer refers to the person who reads or instructs by oral discourse¹¹. Further, this term asserts the authority of language and knowledge-based education in universities. Accordingly, the term *university teacher* is more effective to use rather than university lecturer as the term teacher originated from the Old English verb *tæcan* which refers to show, point out, declare, demonstrate also to give instruction, train, assign, direct, and persuade¹².

However, a teacher is known to be an expert of knowledge and a person who delivers her/his knowledge to her students. As the whole world is in a small device in front of fingertips for the sake of technology, university teacher doesn't want to feed university students like children. Then what is the role of the teacher in SCL? Weimer suggests that teachers should change their traditional part from 'sage on the stage' to 'guide on the side' who views the students not as empty vessels to be filled with knowledge but as seekers to be

guided along their intellectual development journey'¹³. SCL transforms the character of a teacher into a guide, designer, and facilitator of learning. Thus, the roles of students become more active and they try to be responsible and independent in learning without relying on a teacher.

4. The responsibility of learning

In TCL teacher has the responsibility of planning and delivering teaching. Nevertheless, SCL suggests that the student have to take responsibility for their learning. Considering the higher education context adult learners are more self-directed and self-motivated than school pupils. It is important to understand that learners vary. They have their own uniqueness, strategies, rhythm, and habits in learning. A certain teaching method would not support every learner in the class. Hence, SCL liberates students to craft the way of their own learning and encourages innovations, experiments, and research in learning. Moreover, SCL develops the engagement of learners in learning and they develop their self-esteem and confidence by being responsible. SCL expects the students to apply their knowledge in problem-solving and to accomplish their ambitions.

5. The purpose and processes of evaluation

Adult learners are interested in challenges and competition but not to be judged. The purpose of an evaluation is not to test students but 'to promote learning'¹³. In TCL, memorizing and speed of writing become keys in traditional evaluation methods. In contrast to TCL, SCL encourages innovating new, interesting, and creative evaluation tools and methods that help to reduce the stress and tension of students. These evaluations should be transparent and should not discriminate or discourage students.

Condition of the Learning Environment

Most of the schools and universities in Sri Lanka maintain a gap between teachers and students in arranging classrooms or lecture halls. It is similar to the proscenium arch theatre which separates the audience and the play. Actors perform on the stage and the audience sits and watches what they do. The audience cannot access the world of actors and they become passive viewers. Similarly, in a classroom teacher delivers her teaching on one side and students sit and listen while facing her from the other side. This way of traditional classroom arrangement and the hierarchy of seating pattern illustrates the authority of the teacher in the classroom. To enhance the learner engagement and experience in learning, the arrangement of the class could be designed creatively and interestingly.

The learning environment is not only about the physical arrangement of the class. It denotes the condition and the atmosphere of the space and the interaction between teacher and students. Malcolm Knowles highlights the importance of a 'friendly and informal climate, the flexibility of the process, the use of experience, and the enthusiasm and commitment of participants (including the teachers!)'¹⁴ to develop the condition of the adult learning environment. Further, Knowles suggests that the classroom climate should be one of *adulthood*, both physically and psychologically. In an *adult* classroom, adults 'feel accepted, respected, and supported'; further, there exists 'a spirit of mutuality between teachers and students as joint inquirers'¹⁵.

Switching Role: The Case Study

Considering these elements and strategies of adult learning and SCL, I tried to redesign the learning environment for my students to motivate them to engage in learning activities. I tried to understand who they are and what their objectives of learning are. As this group consisted of student actors, they are more interested in using and training their bodies than a lecture-type theory lesson. In other words, they prefer to learn by *doing* than *listening*. By working together and discussing with this team, I identified that most of their ambitions are to become either actors or teachers. Thus, I decided to design a new teaching activity that could align all these aspects together.

I switched my role as a teacher with them and changed my part into a facilitator or guide. I asked them to conduct a workshop for the class based on the key concepts of some acting practitioners. I let them learn by practice, doing, or experiencing. Hereafter, I will use the term *teachers* to indicate the group who conducts the workshop and *students* to designate the rest of the class who is not involving teaching (including myself).

The class was clustered into small groups. Each group consisted of 4 *teachers*. I let each group select one acting practitioner out of two options. Each group had to conduct a two-hour workshop on the basic theories of the selected acting practitioner on the assigned date. They had to innovate new practical exercises to describe the particular theory or to train that acting concept. While one group was doing the teaching, other groups had to become *students*. Each group got two weeks for preparation. At the end of the first week, the group had to submit their session plan and come up with the literature that they found. Then they had to discuss the information they have gathered and I guided them to conduct the workshop. Teachers were allowed to make decisions in preparing the session, designing the learning environment, choosing infrastructures, and leading the class. While *teachers* are getting ready for the session, *students* also had to read about the particular acting theories to challenge the teaching group.



Figure 1. Students Who Switched their Roles as Teachers Planning their Workshop. Copyright 2020 by N. Dewpura

On the day of the workshop, the group of *teachers* had to conduct every activity from welcoming to summarizing. Finally, the *students* had to evaluate *teachers* by giving them points out of 10. *Teachers* had to self-evaluate themselves.



Figure 2. Teachers Instructing Students during the Workshop Copyright 2020 by N.S. Pathirage

Observation | Results

The group accepted the challenge without any reluctance or rewards. As a facilitator, I observed the development of interest, motivation, and engagement of this class. At the first attempt of this activity, I observed that they have done more than I expected and even they challenged me by submitting their session plans before deadlines. They have tried to locate references, tried to comprehend and translate that literature into the Sinhala language. Without my request, they had developed short essays on the particular acting practitioners to share with their *students*. They had innovated and experimented with not only acting exercises but also warm-up exercises and theatre games which match with the acting concept they discussed.



Figure 3. One of the Teachers Experimenting with a New Acting Exercise with her Students. Copyright 2020 by N. Dewpura

This peer-learning environment was exciting, interesting, and full of young energy because of the friendly atmosphere that these activities created. I also was a *student*. *Teachers* exhibited confidence through behaviours and attitudes by receiving the leadership of the class. The workshop went more than two hours with their development of enthusiasm on those activities. Other groups of *teachers* started to compete with previous groups and had long discussions about what they learned and experiences. It was fruitful to see how they respected each other and how they accepted peer-learning. Furthermore, they tried to be logical and reasonable in evaluation.



Figure 4. While Teachers and Students Summarizing and Evaluating the Session. Copyright 2020 by N.S. Pathirage

Following are some of the student's feedback.

'Teaching for undergraduates was a big responsibility. Hence, we read a lot and searched for ways to describe complicated theories in a simple way... Innovating new acting exercises was the best part of this process.'

-Dishani Sandika - Third Year Acting Student - UVPA
12/03/2020

'This process was interesting than the traditional teaching and learning environment of the university. I got a chance to learn from friends and to teach friends.'

-Chathuri Madhushika - Third Year Acting Student - UVPA
12/03/2020

'There is no much Sinhala literature about the acting practitioner we selected. Translating was challengeable'

-Mihiri Udugamasooriya- Third Year Acting Student - UVPA
10/05/2020

Discussion

The concept of switching roles illuminates the standards of adult learning and SCL discussed above. It challenges the traditional TCL methods

and places the student in an active position in both teaching and learning. The responsibility and experience of being a teacher change the dimensions of students' perception of learning. They direct their own learning and shapes knowledge and get the responsibility for their own learning as well as the learning of the rest of the class. They learn to become a teacher and also learn while being a teacher. They learn to learn and learn to share while applying their knowledge in critical thinking and problem-solving in the activity of teaching.

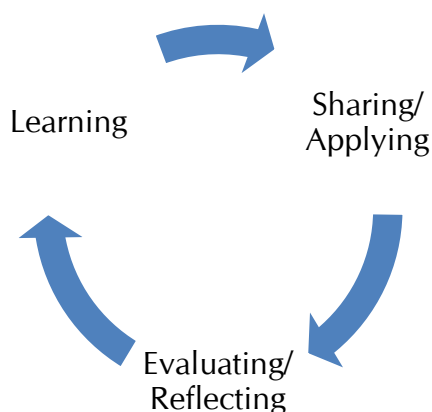


Figure 5. The Cycle of Learning in Switching Role

The acceptance and respect are gained by the group as they have a peer to listen and appreciate each individual. The ability to perform well through self-evaluation and being evaluated further expands their knowledge, skills, attitude, and mindset.

Conclusion

With this case study, this article proves the importance of designing a learning environment that meets adult learners' characteristics and objectives to develop their engagement in education. It redefines both roles of student and teacher; the role of the teacher as a guide and facilitator and the role of the student as a learner and a sharer.

Further, this article assumes that switching the role of power and the responsibility of learning to student aligns with the key concepts of Adult learning and specifications pointed in SDL. Finally, it concludes that 'switching role' has an impact on enhancing the learner engagement and experience in higher education.

¹ Kapur, R. (2019). The adult learner - meaning and significance. p.2 Retrieved from ResearchGate Website:

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- https://www.researchgate.net/publication/335464277_The_Adult_Learner_-_Meaning_and_Significance
- ² Malamed, C. (2009). Characteristics of adult learner. The eLearning coach. Retrieved from <http://theelearningcoach.com/learning/characteristics-of-adult-learners/>
 - ³ Nasaina, M. (2018). Plato's education system in Athens - 4th century. Open Journal for Studies in History, 1(2). 39-48. Retrieved from https://www.researchgate.net/publication/328575201_Plato's_Educational_System_in_Athens
 - ⁴ Joseph, S. (2013). Strategies for enhancing student learning experiences in higher education. The Caribbean Teaching Scholar, 3(2). 97-109. https://www.researchgate.net/publication/275894351_Strategies_for_enhancing_student_learning_experiences_in_higher_education
 - ⁵ Pappas, C. (2013). The Adult learning theory - andragogy - of Malcolm Knowles. eLearning industry website: (<https://elearningindustry.com/the-adult-learning-theory-andragogy-of-malcolm-knowles>)
 - ⁶ Loeng, S. (2018). Various ways of understanding the concept of andragogy. Cogent Education, 5(1), 1496643. <https://doi.org/10.1080/2331186X.2018.1496643>
 - ⁷ Merriam, S. B. (2001). Andragogy and self-directed learning: Pillars of adult learning theory. New directions for adult and continuing education, 2001(89), 3.
 - ⁸ Lieb, S. (1991). Principles of adult learning. Phoenix, AZ: Vision-South Mountain Community College. Retrieved from <http://honolulu.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/adults-2.htm>
 - ⁹ Trinidad, J. E. (2020). Understanding student-centred learning in higher education: students' and teachers' perceptions, challenges, and cognitive gaps. Journal of Further and Higher Education, 44(8), 1013-1023. doi: 10.1080/0309877X.2019.1636214
 - ¹⁰ Wright, G. B. (2011). Student-centered learning in higher education. International Journal of Teaching and Learning in Higher Education, 23(1), 92-97.
 - ¹¹ Dictionary, O. E. (2020, 05 20). Lecture. Retrieved from Online Etymology Dictionary: <https://www.etymonline.com/search?q=lecture>
 - ¹² Dictionary, O. E. (2020, 05 20). Lecture. Retrieved from Online Etymology Dictionary: <https://www.etymonline.com/search?q=teach>
 - ¹³ Wright, G. B. (2011). Student-centered learning in higher education. International Journal of Teaching and Learning in Higher Education, 23(1), 92-97.
 - ¹⁴ Smith, M.K. (2002). Malcolm Knowles, informal adult education, self-direction and andragogy. Retrieved from <https://infed.org/mobi/malcolm-knowles-informal-adult-education-self-direction-and-andragogy/>
 - ¹⁵ Merriam, S.B. (2001). Andragogy and self-directed learning: Pillars of adult learning theory. New Directions for Adult and Continuing Education, 2001(89), 3.

CHAPTER 9

Enhance Student Engagement Through Improving Learner Autonomy and Creating a Positive Learning Environment

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Introduction

Decades ago, most educational systems were often criticized as teacher-centered and not engaging for students. As a result, the tertiary education system underwent several reforms targeted at changing standards of education, teaching approaches, and educational environments during the intervening years. However, despite these efforts, the comparisons of national and international student achievements indicated underperformance and increased dropout rate in many disciplines over the past few years. Research into educational reform and implementation has found that the failure of such effort is due to chronic disengagement of students toward learning and the conventional teacher-centered teaching-learning process.

In the recent past, there is a growing realization that the lack of student engagement is one of the critical problems faced by the many educational systems. The huge attention which was diverted to the concept is completely reasonable and easily understood, because it is proven that students who are well engaged in the process of teaching and learning are more likely to perform well in academics and are less likely to give up the university education.

There can indeed be noticeable gaps in the level of student engagement from one institute to another and across different courses as well as individual commitment. One might attribute the reason for such a gap is either due to variations in the teaching skills of teachers or poorly performing students. However, the practical evidence points out the reason for this disparity as different levels of student engagement. It is also evident according to much literature that even the academic performance of a student with very low grades can be improved through positive engagement. For example, students who have been recognized as "poor performers" when taught by a certain teacher may fall under the category of "high

achievers" when taught by a skilled teacher. Thus, it is essential to explore in detail about student engagement and various approaches that can be used to engage students during the teaching-learning process actively. Therefore, nowadays many educators and policymakers have shifted their primary focus into implementing techniques of enhancing student engagement and learning experience in university curricula as it is one of the major tactics that ensures both student retention and improvement in student academic performance. In addition to that, when considered student engagement from a border perspective, it is often regarded as a long-term disposition towards learning and it makes learning fun and important. In conclusion, an engaged student is a lifelong learner and independent thinker who is eager to engage with the great world community. This paper explores the possibility of enhancing student engagement by improving the learner environment and autonomy.

Before proceeding into the elaboration of effective methods that would stimulate the engagement of students in learning, it is necessary to have a detailed theoretical understanding of the subject of student engagement and the indicators that can be used to assess the level of student engagement.

What is Meant by Student Engagement?

Engagement in learning is believed to be the key determining factor for a student to succeed in higher education. Student engagement has been defined in different platforms and literature. Here, it refers to the commitment and purposeful overall effort expended by students towards all aspects of learning including both pedagogical and informal teaching-learning activities, and to persist despite obstacles and challenges.

An engaged student is recognized as an asset to the higher education institute as a person who is involved in learning and extracurricular activities, identifies himself/herself as important within the university, and is motivated to invest in learning by working extra steps to get better academic outcomes.

According to recent literature, student engagement is a broader construct that comprises three primary domains, namely; behavioral, cognitive, and emotional engagement.

Behavioral Engagement

Behavioral engagement is frequently described as an engagement based on student conduct and participation in the academic, social, and extracurricular activities of the university. And also, overall behavior about university norms, expectations, and values. In other words, behavioral engagement further refers to a particular student's behavior towards learning, such as taking the initiative in class, maintaining continuous

attention and concentration, exerting effort, being persistent in the time of failures, positively interacting with teachers and peers. Students can exhibit either positive behaviors (e.g., When a student follows normal rules and guidelines of an institute), which are indicators of higher student engagement, or they can exhibit negative behaviors (e.g., when a student is being troublesome in the classroom or disobeying for the instructions of a teacher, poor attendance for the lectures), which are indicators of lower student engagement or disengagement.

Cognitive or Intellectual Engagement

It is an aspect of engagement, which is focused mainly on the student's inner enthusiasm and investment towards the process of learning, which incorporates the internal psychological factors of the student or their concealed personal skills that enhance effort exerted in learning, comprehension, and acquiring the knowledge or skills that are highlighted in their academic work?

A student who engaged cognitively is strategic, considerate, and motivated to make the necessary attempts for the understanding of complex topics or mastery of arduous skills explicitly taught in the university.

Emotional Engagement

This domain of engagement mainly concerns about the student's sense of belonging or worthiness to their teachers, institute, or peers (e.g., undivided attention, display of enthusiasm, respect to the staff, and peers). In other words, this is based on identification with the institute including the feeling of being important to the university, admiration of success in institute associated outcomes. Besides, emotional engagement also focuses on the scope of positive or negative interaction with peers or classmates, academics, and university in general. Thus, positive emotional engagement leads to healthy student relationships with the institute and greatly influences the preparedness of students to study and participate in university-related pursuits.

The expected engagement takes place when a student makes a psychological investment in the teaching and learning process and working hard at their maximum best to receive what lecturers have to offer.

A Student who is adequately engaged with learning tends to demonstrate continuous involvement in education as well as an optimistic emotional tone towards the learning tasks.

Indicators of Student Engagement

Active learning creates a teaching and learning environment primed for student involvement. Student involvement through active learning can be achieved by both learner-centered learning tactics and teacher-centered strategies. In teacher-centered learning, the teacher plays a major role in the

lecture. On the other hand, learner-centered learning provides the main focus to the learner and the teacher acts as a facilitator.

It is often necessary for a teacher to know whether the students in a class are engaging with the lesson, classroom or the strategies which have been used to deliver the lecture are effective. The following are a few observable indicators that might guide the teachers to achieve the above-mentioned goal effortlessly. If the teacher knows what to observe for, he or she can easily determine the degree of engagement that each student is denoting and can implement necessary actions to address the disengagement.

During a Lecture

Student engagement should begin at the very moment that the students walk through the classroom door. Therefore, the teachers often can get a sound idea on how their class is about to be proceeded based on the student's appearance and behavior at the onset. Many teachers, usually, begin their classes with teacher-directed instructions. It is a known fact that the most important component of a lecture is the beginning, if it is delivered properly, the teacher will be able to attract student's attention throughout the session.

Indicators of Emotional Engagement

- Students are happy, and make proper eye contact with the teacher as they receive instructions or while paying attention to the lecture.
- Students show respect towards the teacher and peers throughout the session.
- They positively accept constructive criticism by both the teacher and peers.
- They respond eagerly to the questions asked.
- They enthusiastically offer their views when asked.

Indicators of Behavioral Engagement

- Students come dressed with appropriate attire and obey the classroom rules and regulations (e.g., come to the lecture on time, more than 80% attendance)
- Students often come to the class well prepared with all the necessary textbooks and handouts.
- They actively listen and guide the teacher with positive body language throughout the course of the lecture.
- They respond promptly to the teacher's directions.
- They diligently start review whichever is assigned by the teacher.
- When the teacher introduces new concepts, they are enthusiastic and respond positively.
- Their eyes track the teacher's animated account.

Indicators of Cognitive Engagement

- Students present to the class after referring to the required supplementary material related to the subject.
- Students ask in-depth questions that go beyond the topics delivered in the lecture.
- Students often make connections with the material presented and their pre-learned ideas and offer insights accordingly.

During a Group Activity

It is proven that team-based learning is one of the best methods to engage students with learning. During group work, usually, each group will have a specific learning goal and the teacher is there to facilitate and monitor the process of learning.

Indicators of Emotional Engagement

- Students positively interact with the peers of the group and they seem to be well fitted.
- They willingly offer their opinions during group discussions.
- Colloques of the group communicate with each other with kindness and respect.
- Students' facial expressions and emotional tone indicate their interest and enthusiasm for the designated assignment.
- The members of the group are open to constructive criticism.

Indicators of Behavioral Engagement

- Students' contributions to the group work well aligned with the rules and parameters set by the teacher.
- They listen actively to the opinions of their peers.
- They willingly complete their share of work.
- They exert their maximum effort to accomplish the goals and do their best in assigned roles.
- They highly focus on group tasks and are initiative during the activity.

Indicators of Cognitive Engagement

- Students are very attentive, they take notes when necessary regarding the topics that are discussed in the group, keen on grasping the key points, and attempt to build upon the concept.
- They provide insightful remarks and try to pull out information from the content they have learned previously.

During Independent Work Time

At a certain point, all the students ought to spend some time working individually to understand or master the lesson objectives. The following

indicators will demonstrate the degree of student engagement while doing independent learning.

Indicators of Emotional Engagement

- Students appear to be focused on and interested in their work.
- They will not get distracted easily by other influences such as social media.

Indicators of Behavioral Engagement

- Students work assiduously and meticulously, and focus remains towards excelling whatever they do.
- They show perseverance even with the difficult content.
- They often complete the assignment and submit them on time.
- If they have queries or clarifications regarding the content they have learned, they will immediately lookout for the teacher's assistance.

Indicators of Cognitive Engagement

- Students use aiding tools, equipment, and techniques (highlighters / sticky notes/create mnemonics) that best enable them to comprehend the material.
- They may solve a couple of extra problems or refer to past papers to better master the concept.
- They will read supplementary materials and make own set of notes.
- They come up with questions that go beyond the course content and are connected to other ideas.
- They usually re-check their tasks once completed for potential mistakes.
- They seek out additional resources or materials on the subject to learn more.

The big picture of student engagement is so much more than the students who do not fall asleep during a lecture. It is a long-term disposition towards learning, it makes learning more fun and meaningful experience. Engaged students, also, learn to take part in groups and being part of a social institution, which are often considered as critically important soft skills for life. And also, student engagement is much more than the strategies being used by the teachers to capture student's attention. It is about, establishing a positive university culture that provides a safe and more welcoming environment for the students to learn and promoting students to become autonomous learners by igniting their intrinsic motivation to study.

What is a Positive University Culture?

The culture of an educational institute refers to the perceptions, prospects, documented and non-documented rules, and relationships that

shape and denote every aspect of how an institute functions. Also, the above term encompasses the interactions between the people in the organization. Furthermore, the foundation for education invariably builds in the context of a safe, well-nurtured classroom with effective and positive communication. Learning becomes more meaningful and engaging when the classroom environment is one of welcoming mistakes and open to constructive criticism as a natural process and a positive part of acquiring and exercising new skills. By facilitating a mutually respecting classroom culture that embraces the diversity of opinions and ideas, students can effectively articulate their thinking judgment-free even if those thoughts are different from others' ideas and thoughts. Therefore, establishing an encouraging, safe, satisfying environment for learning is essential for student engagement and success.

Characteristics of Positive University Culture

- Students and academic staff feel safe both emotionally and physically. Also, the institute administrators and policymakers take the necessary actions to ensure safety.
- The relationships between staff members of both academic and administrative are collaborative, collegial, and productive. All the staff is held to high professional standards.
- The administrators, teachers, and staff members always act as role models, who ensures healthy behaviors for students.
- Relationships and interactions between everyone in the institute are characterized by mutual trust, openness, appreciation, and respect.
- Crucial leadership decisions are made collaboratively with the inputs from administrators, staff members, and students.
- The mistakes are never punished as failures, but they are often considered as opportunities to grow and learn for both educators and students.
- The individual achievements of both students and teachers are highly regarded and appreciated.
- Criticism, if mentioned is often constructive in nature and well-intentioned, not antagonistic or narcissistic.
- The learning opportunities and the educational resources that are available at the institute are equally distributed among all the students including minorities and students with disabilities.
- Well established, tailor-made mentorship program, which enables students with opportunities for learning and academic progress.

Fostering Student Engagement through Autonomous Learning

Learner autonomy simply does not mean that letting students do whatever they want, rather it focuses on allowing students to understand

their responsibility for their learning. In other words, autonomous learning is a process of learning where learners themselves assume to make their own decisions and take initiative in learning, to achieve their self-goals, while teachers are relegating to the background and contributing as facilitators in the process by giving pieces of advice and mentorship when necessary. Besides, autonomous learning provides the opportunity to transform learning from teacher-centered towards student-oriented learning. Meaningful student involvement in learning is paramount to foster active student engagement and improve student's academic achievements. The progressive development of a learner's capacity for autonomy does not happen overnight in isolation, but through continuous interaction with peers and teachers. To become an autonomous learner, the students need to develop psychological and emotional capabilities which in turn aid them in controlling their learning independently as well as collaboratively. Educators can create an opportunity for students to interact within the classroom and provide an environment where learners can determine their strengths and weaknesses and set up goals for themselves. Various strategies have considerable potential for enhancing the development of learner autonomy. The following are a few such strategies and approaches that can be used to improve the student autonomy towards learning.

Setting Clearer Performance Standards from the Beginning

The educators ought to establish and share clear procedures and guidelines for students at the very beginning so that, the structure will enable positive aspirations and interactions in the future. Students should have the awareness of exactly what is expected of them and how they will be assessed and graded during the teaching-learning process and what support or assistance will be readily available to them if they need any help learning the course content or skills. In this kind of approach rather than a teacher telling what students are expected they collaboratively co-create expected learning goals and proactively addressing any misconceptions or doubts regarding the materials with the students in general. The foundation for autonomous learning is build up only when students fully comprehend and incorporate their teacher's vision for learning and better performance. When there is a clear set of intended outcomes that focused on each student's ability and strength that leads to more effective student development and an engaging learning experience.

Incorporate Relevant Examples and Real-life Scenarios

The teachers must incorporate real-life examples into their lesson plans. Because when the students notice that they can apply what they are being taught in their life situations or problems professionally, they tend to be more attentive and involved in the lesson. Especially in a higher education setting, adult learners are motivated when they know the benefits

of learning and the costs of not learning. If the topics and content are more relevant to their career progress, adult learners will automatically commit to the learning process.

Content Should Appeal to Student Interest and Curiosity

Curiosity invariably the greatest attribute of intrinsic motivation and also it has great potential to enhance student learning. For example, research has indicated that in medical education, when the information presented as puzzles with real-life scenarios is more appealing than just teaching theory. This is because the curiosity evoked in the learner is extremely essential for deep learning. Another such approach is the introduction of unfamiliar concepts through the familiar. In other words, build up a concept upon the student's prior knowledge. For example, teachers can use student's current knowledge, interest, and experience with a familiar concept, such as trying to teach the concepts of human evolution on the ground of basic biological knowledge related to animal kingdoms learned during high school. This will make the content and material more relevant and learning to become easier and more efficient.

Reflective Writing and Self-Assessment

Encourage students to maintain a reflective journal or a personal blog, so that they can evaluate or track their progress as they acquire expected knowledge and skills. When students learn to self-monitor the progress, they tend to become intrinsically motivated by the success and start to acquire a feeling of ownership and responsibility for the role they play in these outcomes and performances.

Providing Structure for Feedback

This is another important aspect of motivating learners by establishing a system of timely, understandable, and actionable feedback. In the past, teachers were used to giving feedback through grades, assignments, and meetings at specific points throughout the course. Sometimes, this approach of feedback may be ineffective because it is too late as students are not allowed time to make changes in their learning process before they face the endpoint summative assessment. Therefore, teachers must give feedback throughout the course during formative assessments, problem-solving discussing forums, both in small and large groups teaching-learning sessions, individual conversations, and not just on a concluding bar examination. This communication ensures students have adequate time to react to and implement the feedback they received through revisions. The feedback should always be specific and comprehensive and ensuring students know exactly which parts of their answer need revision or what section of their solution contains mistakes. Actionable feedback

enables students to take an objective view of teacher or students' feedback and immediately make necessary changes.

The feedback must be timely, voiced in clear language, direct input rather than vague comments and praises. Further, this will allow the students to critically evaluate his/her learning process and take the necessary actions.

In conclusion, the ultimate goal of any university is to provide their students with the essential skills, attitudes, and knowledge that necessary to well align with the graduate attributes and flourish in a meaningful career following their academic endeavors. As academics, however, we aspire something extra, to instill and cultivate in students an epistemic curiosity that will lead to lifelong learning and to be initiative at their learning that encourage them to become independent thinkers. To accomplish these goals, require not only the commitment and yearning on the part of the faculty and teachers but also the enthusiasm of students to demonstrate the willingness and engagement in their learning. As educators, we have to provide opportunities for students to foster learning autonomy and to create a safe, welcoming, and non-judgmental learning environment which ensures maximum student engagement.

CHAPTER 10

Enhancing the Effectiveness of University Teaching Through Active and Wholesome Learning

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The Challenge

As lecturers, we want to produce balanced graduates who will show considerable development in terms of knowledge, skills, attitude, and mindset (KSAM) which will lead them to be employable by the time they graduate either in the industry or as graduate teaching assistants (GTA)/graduate research assistants (GRA) in postgraduate degree programs. We also want to produce inventors and innovators that have the potential to push their novel ideas to the limit to create new job opportunities as entrepreneurs. The open question is “Are our university curricula and the lecturers together as a unit successful in achieving this outcome?”. In my opinion, we have not yet achieved that level. We have a long journey to go.

Active Learning Environment

Every year the university intake for degree programs increases. Nevertheless, we don't see a parallel increase of funds being allocated for higher education to accommodate the increased number of students. One of the main consequences is the increased number of students for a given lecture, resulting in bigger classes for the lecturers to teach. Teaching bigger classes always poses many challenges. One of the biggest challenges to maintain an active learning environment. What exactly is an active learning environment? It is an environment in which the student thinks about the subject matter that is being taught in the class. In a bigger class with lot of students, many students tend to become passive listeners. Although they might be looking at the lecturer, their minds are in someplace else. Only some students who are really eager to learn the subject matter get actively engaged with the lecturer. Research done by many groups^{1, 2} shows that active learning improves student performance and retention of knowledge when compared to traditional, passive lecture-based teaching. Therefore, as

lecturers, we must try to create an active learning environment for our students.

It Is not a Race to Cover the Syllabus

One of the biggest hurdles that we have to cross as lecturers is the constant struggle for covering the syllabus on time. Most of the time we have to deliver lectures in a course syllabus of which was not developed by us. Most of the course developers have fallen into the habit of overloading the syllabi with too much material. Sometimes it is nearly impossible to cover all the theory in the syllabus. In that kind of a situation the lecturer tries to cover the content at all costs. During this process many of the students that cannot keep up with the rate at which new ideas are presented, become passive listeners. According to Dr. David Katz³ this can be explained as a 'mental dazzle'. Just like too much light can dazzle our eyes and make it difficult for us to see anything, too many new ideas presented at quick succession can overload the processing capacity of a student. Therefore, we have to be very careful when developing syllabi and always make sure that we have included content leaving enough time for discussing the content.

Planning the Lecture Ahead of Time

Dedicating enough time for discussing the content also raises the importance of preparing lesson plans prior to lectures in a regular manner. The lecturers should divide the time accordingly so that they get enough time to discuss the material they present. It is very ineffective in terms of retention of knowledge if we keep on lecturing for an hour or more. Research done by Hartley and Davies⁴ shows that the attention of the students typically increases from the beginning of the lecture up to ten minutes into the lecture and then tends to decrease. Therefore, we should always make sure to break up the lesson into parts and allocate time for discussion activities. Another factor we have to consider is that some enthusiastic students take the time to write down some notes while the lecture is going on. This note-taking mostly involves listening to what the lecturer is teaching and then writing down some quick and concise notes in their own words. According to Bloom's taxonomy of learning skills, this activity of listening to facts and transforming those facts into their own words accounts for going from a level one skill (knowledge by knowing facts) to a level two skill (understanding the facts). Therefore, giving the students enough time for taking down necessary notes is a very important aspect of teaching. If the lecturer is in a hurry to cover the theoretical principles, it will discourage this kind of note-taking by the students.

Keeping the Students on Their Toes

If attention gradually declines after ten minutes into the lecture, it is up to the lecturer to use teaching techniques appropriately to maintain the

student attention. One of the activities we can use to get the students thinking about what is being taught in the class is to give them a writing assignment. Many lecturers who conduct large classes are quite reluctant to give writing assignments because it is very cumbersome to grade assignments of a huge number of students. This doesn't have to be the case. One of the famous techniques that is being adopted all over the world, especially in large classes is the use of 'minute paper'. In this technique, the lecturer stops the lecture at a certain point and asks the students to take a piece of paper and write about a certain topic that was already discussed during the lecture. The choice of specific writing activity is up to the lecturer. The lecturer can ask the students to write answers to a question or to write a summary of the main points that were discussed during the lecture up to that point. If the lecturer is concerned that the students might not be appropriately prepared for the minute paper when it is given at a random time during the lecture, he/she can inform the students at the beginning of the lesson, that at some point in time during the lecture they will be asked to write a minute paper. At the same time, the lecturer can explain the students the reason for adopting such a technique. He/she can explain how it contributes to active learning and how valuable active learning is for the retention of knowledge as has been confirmed by the educational research. The duration of time given for the students to write the answer is usually a maximum of three minutes. Depending on the context this can be reduced to even one minute. At the end of the three minutes, the lecturer can either collect the answer sheets with the help of the demonstrators or break up the students into small groups and ask them to discuss their answers with each other. This discussion of facts among peers is of vital importance. Students learn to listen to different views and takes on the same problem. They develop more rapport with each other. The discussion also broadens their horizons of thinking. Another important factor is that discussion leads to the removal of fear in expressing themselves. Most of the time students are quite at home in discussing matters with their peers.

Another active learning technique that is quite similar to 'minute paper' is 'guided lecture'. This technique is also an ideal technique for creating an active environment. In a guided lecture the lecturer conducts the lecture for some time while giving the students enough time to take notes. Then the students are given time to go through their notes after which they are requested to discuss each other's notes to compare and contrast and to remove any inaccuracies if there exists any.

Another method to facilitate active engagement with a topic is 'buzz groups'. Buzz groups are small student groups which typically contain three to eight student who sit close to each other. In a classroom setting, the lecturer can count the rows of students and categorize them as either 'odd' or 'even' and ask the 'even' row students to carry out the discussion with the adjacent 'odd' row students. Typically, this kind of a discussion is allowed

to go for about ten minutes. Each buzz group is assigned a group leader by the group itself whose task is to make sure that the discussion sticks to the subject matter and to write down the important points that arise from the discussion. These points will then be presented to the class by the group leaders at the end of the ten minutes.

Most of the time, students lose their way during the lesson when they feel that they have already missed some important points. Rather than engaging with the lecturer to request to go through the missed points, students resort to passivity. One way to overcome this from the lecturer's perspective is to give summaries of the key points at regular intervals during the session. This gives a chance for the students who have missed some points to catch up on those points and keep abreast of the lecture progress.

Detrimental Influence of the Culture and the Almighty Lecturer

Our educational system has been highly influenced by our cultural norms. The type of upbringing of a child according to traditional Sri Lankan culture while doing so much good for a child's future can sometimes go on to smother the child's ability of free thought. As children, most of us were accustomed not to question the methods of our teachers. Even if there are some missing pieces here and there and the theories that are taught don't look very credible, many students tend to dogmatically accept what is taught by the teacher without questioning. This is a huge barrier to the intellectual development of our students and the country as a whole. This is the main factor that differentiates Sri Lankan students from the foreign students. This state of shyness and the backwardness of the students increases further due to the teaching styles of some lecturers. Some lecturers are not very interactive with students at all and tend to frown upon students who have questions that they cannot answer.

This behavior is more pronounced with senior lecturers and professors. Some of them act as if they are gods and their methods can never be criticized by the students. In countries like the United States regardless of the ranks of faculty members, students have been always encouraged to question lecturers about the subject matter and also the teaching methods adopted by lecturers. Another important factor is that unlike in many developed countries, in Sri Lankan state universities we don't give the corrected question papers of final exams back to the students. Therefore, even if there has been some deliberate act of unfair grading, students don't get the chance to fight back. This makes the power of a lecturer over the students even more pronounced. Due to these factors, students are quite scared of asking questions from lecturers. As lecturers, we are responsible for maintaining an air of humbleness around us so that the students feel that we are more accessible. The high-handed behavior of lecturers smothers the creativity of students' minds. This hampers the prevalence of an active learning environment.

Dealing with Unresponsiveness

One of the biggest issues faced by the lecturers is that students being unresponsive when they have been asked questions verbally during lectures. Lecturers tend to randomly pick certain students during lectures and ask questions from them to make sure that the students are following the lecture. Most of these questions are left unanswered as the students just keep staring without answering the question. This problem is more frequent in large classes. This tendency of students to not answer questions can be due to various factors. Some students are completely bored with the lesson and have already given up and therefore don't answer questions due to boredom. Some students want to answer the questions, but they just don't know the answer. Some students are quite backward in answering questions due to their social upbringing and cultural background. Another very important reason is the fear that they might give the wrong answer and get humiliated in front of everyone. One of the reasons they fear in getting the wrong answer is that some lecturers are quite famous for humiliating students who give wrong answers in front of other students. Some questions are like traps. As an example, a question like "This is an example of what?" can have an infinity of wrong answers. The students know that there is one correct answer and the lecturer knows that answer. Some students might even feel like they know the answer but they don't want to take a risk and become the laughingstock of the class. One way to avoid this situation is to ask more general questions that don't have any right or wrong answers. We can change the above question to something like "How do you feel about this?" or "How does this look to you?". This type of question can reduce the risk from the perspective of the student and is more likely to lead to some discussion. Discussion is what we need. The more chance they get to discuss the subject matter, the more active the learning experience will be. The more active the learning experience, the more fruitful will be the knowledge transfer and retention.

Slideshows for Providing an Outline Only

Many lecturers tend to believe that their slides should contain all the information the students need to know. Some lecturers even communicate this verbally to the students during the lectures. Students are always on the lookout for chances to relax into passivity. When the students get to know that everything will be given to them in the form of slides, they tend not to exert themselves too much during the lecture to understand what is taught. They get the mindset that even if they don't focus during the lecture, they will still be safe because they can just download all the slides later and study at their leisure and everything will be just fine. Research by Hartley⁴, Annis⁵, and Kiewra⁶ shows that while a skeletal outline of the lecture is useful and helpful to students, providing them with detailed notes tend to relax them into passivity. Too much of detail can overload their processing capacity as

well (described previously as 'mental dazzle'). Lecturers should ideally provide the outline of what is taught in the class in the lecture slides. We should give an opportunity for the students to fill the gaps in their own words. This motivates them to be alert to write down notes regarding important points discussed during the lecture which contributes to creating an active learning environment.

Make it Tangible, Connect it with Reality

Students are more welcoming towards subject matter that they can easily relate to their daily experiences. This in turn depends on the concrete examples provided by the lecturer that makes it easier to connect the theory with the real world. If the students cannot make any connection between what is taught in the lecture and the real-world scenarios, they tend to get bored. This can be mainly because they cannot understand why they are learning this. Without concrete examples, some students will even feel that it is an utter waste of their time. This has a lot to do with not getting properly prepared to deliver the lecture. The lecturer is responsible for searching through different offline and online sources to come up with appropriate examples and analogies which help in making the concepts more tangible. As lecturers we want to produce graduates who can use the concepts they learn, to make a positive difference in the world. Therefore, it is extremely essential that we always create regular links between concepts and how they can be practically applied in a real-world setting. When the students can see this connection, they become more enthusiastic and show more active engagement with the lesson.

Showing the Destination at the Onset

Gestalt theory of psychology suggests that the whole is greater than the sum of individual parts. From a lecturer's perspective, in terms of delivering lectures, the theory suggests that rather than building up gradually to a final goal and then telling the students why they needed to learn all the theories they learnt at the beginning to reach the goal, it is better to start the lecture by showing the final goal first. The lecturer shows the final goal at the outset and then shows the students what they need to learn in order to achieve that goal and how each of the subsidiary goals connect together in achieving the final goal. Then the students don't feel lost as to why they are doing what they are doing. They already know how everything falls in place and feel that they are edging towards their goal inch by inch. Minimizing the number of students who are 'lost' in terms of what is happening around them during the lecture contributes to creating an active learning experience.

Keeping Students Engaged even Outside the Class

Lecturers use many different methods to get the attention of the students and to maintain an active learning environment in the class. The

problem is when they come to the class the next time most of them haven't gone through the notes. Therefore, it is important to assign activities to students to keep them engaged. With the advent of technologies like Blackboard, Moodle many universities are maintaining Learning Management Systems (LMSs). These LMSs can be optimally utilized to keep the students engaged with the subject matter. One such technique is to create online question banks. The type of questions that can be asked can be showcased online for the students to see. By going through the questions in the question bank, the students get to know what sort of preparation they should have to face for the mid-term exams and the final exam.

Hard to Remember? Attach a Memory to It

Students remember concepts most of the time when there is a good memory attached to them. If they enjoyed learning some concept due to some activity that was used, then their memory may last for a long time. Following this concept, the lecturer can enliven a class using activities like debates. The structure of the debate, including the rules, time allocations, the task of the proposing team, the task of the opposing team can be explained to the students via a handout given by the lecturer. An example topic might be "Chemistry is the central science". The more the students try to collect points for and against the topic, the more they think about the concept and get actively involved. At the same time, students gain new skills like how to work as a team for a common goal, how to juxtapose arguments in a logical flow, how to carefully listen to a speech and analyze it to extract important points.

A Well-Rounded Graduate through Wholesome Learning

As lecturers, we want to produce graduates who have a wholesome life, well-balanced with knowledge, skills, good attitudes, and a positive, humane mindset. A student who may be filled to the brim with knowledge and skills is probably not going to lead a stable, and a balanced life that will add goodness to the world if he/she is not in possession of good attitudes and a humane mindset. Adolf Hitler had knowledge and skills but lacked good attitudes and a humane mindset and thus went on to bring about so much grief and destruction upon mankind. We don't want to produce Hitlers through our programs. We as lecturers want to deliver to the society, students who have not only good knowledge and skills but also good values. For that to happen we have to create activities that make students interact with each other, society, and nature. With each such encounter the chances for the students to polish their soft skills and values increase. They learn to respect each other as human beings. They learn to pay more attention to nature and enjoy the simple pleasures given by the smell of raindrops falling on dry land, the night sky gazing upon us, presenting us with so many unsolved mysteries, bees frolicking around flowers to gather honey for their

hives. If they are confined to studies within closed doors, negative feelings like depression, hatred towards society can seep into their minds. That is why we should always promote wholesome learning which creates a wholesome, balanced human being. We should act as ambassadors who advocate the importance of values such as honesty not only in an academic setting but also in real life. If we ignore incidents of academic dishonesty, fake laboratory experiment data, as 'small' incidents, these students might go to the outside world and scale up these activities into grand proportions. Therefore, it is our responsibility to discourage these activities via advice and penalties.

Being There for Students

When students have problems in academic life, and their personal life, and if we can see that those problems are eating into the student mind, destroying them from inside, as mentors we should come forward to lend them a helping hand. It is true that in a university we have adult students and there is always only so much we can do without crossing the limits. At the same time as responsible teachers, we should be knowledgeable and versatile enough to come up with mechanisms to safeguard our students in every possible manner: psychologically and otherwise.

Let us Produce Good Humans, not Machines

Our lectures should not sound like a bunch of technological jargon towards which the students have almost little or no sensitivity. Whenever possible we should relate the incidents from our lives that can present themselves as backbones to strengthen their lives. We shouldn't just be lecturers who connect with students through a slideshow once or twice a week or else through an assignment. In my opinion, we have a much bigger responsibility and a much broader role to play in their lives. There are many universities out there that offer almost the same degree program. What should we do in order to make sure that our graduate stands out from the rest? What will give him a distinct competitive advantage? His subject skills will do as far as getting him called up for an interview. What really gives him that final push which lands him in his job are mostly the soft skills: effective communication, social etiquette, listening, and getting along with people. We are not in the job of creating human machines. Our job is shaping the lives of men and women who are about to go out there into the society and start lives of their own. We have a huge role in making sure that they have a positive effect on society, Sri Lanka, and the world at large. Any assignment we ask them to submit, any teaching activity that we organize, any example we pick in order to make the subject matter easier to understand, should be based along the lines that we are contributing towards the creation of a balanced individual who is equipped with the knowledge and humane qualities. This is the bread and butter of wholesome learning. Such balanced

individuals will be more effective in working with people in general and disseminating their knowledge throughout the community in a more efficient manner. They are more likely to go out there into the world and make it a nicer and a humane place to live in.

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- ¹ Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., and Wenderoth, M. P. (2014) Active learning increases student performance in science, engineering, and mathematics. *Proc. Natl. Acad. Sci. U. S. A.* *111*, 8410–5.
 - ² Lucas, K. H., Testman, J. A., Hoyland, M. N., Kimble, A. M., and Euler, M. L. (2013) Correlation between active-learning coursework and student retention of core content during advanced pharmacy practice experiences. *Am. J. Pharm. Educ.* *77*, 171.
 - ³ Katz, D. (1950) Gestalt Psychology: Its Nature and Significance, pp 118,125-126.
 - ⁴ Hartley, J., and Davies, I. K. (1978) Note-taking: A critical review. *Program. Learn. Educ. Technol.* *15*, 207–224.
 - ⁵ Annis, L. F. (1981) Effect of Preference for Assigned Lecture Notes on Student Achievement. *J. Educ. Res.* *74*, 179–182.
 - ⁶ Kiewra, K. A. (1989) A review of note-taking: The encoding-storage paradigm and beyond. *Educ. Psychol. Rev.* *1*, 147–172.

Section 03

Promoting Engagement and Experience among Language Learners

CHAPTER 11

**Towards a better Instructional Design in Teaching English:
Peer Tutoring and Flipping Class to Enhance Learner
Engagement and Experience**

P. D. S. N. Dissanayake

CHAPTER 12

Peer Scaffolding to Enhance Language Learning of ESL Students

P. W. R. C. Wijenayaka

CHAPTER 13

**From the Banking Concept of Education towards a Critical
Pedagogy: Strategies That Enhance Student Engagement in the
ESL Classroom**

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CHAPTER 11

Towards a better Instructional Design in Teaching English: Peer Tutoring and Flipping Class to Enhance Learner Engagement and Experience

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Teaching English at Tertiary Level

English language proficiency is of paramount importance to the learners in higher education. It is demanded by the employers as an obligatory life skill too. Even though the English teachers with professional expertise in higher education are expected to produce all graduates equipped with good English, Sri Lanka is still at an early stage of establishing a firm mechanism with the potential of achieving the expected outcomes and linguistic competencies. The deficiencies are with curriculums, lesson planning, teaching-learning methods, strategies, materials, teacher and learner attitudes as well as student backgrounds. English Language Teaching (ELT) can be accelerated through specific instructional organization that promotes meaningful learner engagement and experience.

Learner Engagement and Experience in Learning

It is well realized by the teachers that engaged learners are driven by their will and tend to master the content or language in the learning process. Accordingly, active learner engagement is a requisite which demands a cognitive investment together with affective and psychomotor involvement, especially through intrinsic motivation in adult education. The enticing experience students obtain while they are engaged in learning will persist with them as such experiences are fueled by essential qualities like discovery, social networks, identity, and values. It is important to bridge the gap between instruction leading to learner experience and their needs in order to boost engagement in learning.

Rather than training or rote learning advocated by the behaviourist theorists, student engagement and experience are provoked by an amalgamation of behavioural, affective, cognitive, psychomotor, and socio-cultural aspects. As an encapsulation of the concept, Connor (2009)¹

identifies learner engagement in postsecondary environments to be equipped with active, supportive, collaborative learning and undertaking challenging and enriching educational experiences by a learning community. When students are highly engaged and learning through experience, it leads to high retention.

Learner engagement can be discussed under numerous educational theories and some of them, namely Experiential Learning, Socio-cultural Theory and Community of Practice can be elaborated as follows.

Experiential Learning

Kolb (1999)² explains learning as a process which creates knowledge as a transformation of experience. Learners are actively involved in learning and in fact, they learn from experience. There is a necessity to bring the outside into the classroom and to provide a learning experience inclusive of authenticity, challenge, collaboration, and reflection.

Socio-cultural Theory

The socio-cultural theory (Vygotsky, 1978)³ delineates that the input served by the environment through a Zone[s] of Proximal Development (ZPD) with More Knowledgeable Others (MKOs) makes a student collaboratively engaged with their peers (Refer: Figure 1). The learner is aided by the fellow group members and the team is converted into a rich source of language acquisition with interdependence. Simultaneously, the learner's biological endowment will do the rest to acquire the language. Thus, higher-order thinking emerges through social interaction and engagement.

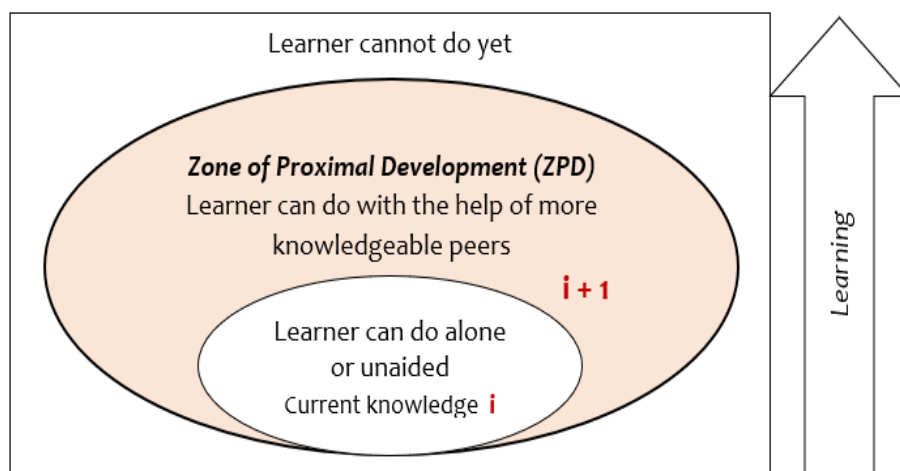


Figure 1: Zone of Proximal Development and Input Hypothesis

At this particular state, the language input becomes slightly beyond the current level of learner's competence ($i + 1$) as a result of the interaction

with more capable peers and thus, the language is highly acquired. Accordingly, the socio-cultural theory appears to share the Input hypothesis of Stephen Krashen (1982)⁴. The learner becomes capable of moving from the current level of competence or stage i , to the stage immediately following i.e., $i + 1$. So, learners acquire language best when they are exposed to input which is slightly beyond their competency level. In addition, the socio-cultural theory builds up a cooperative learning environment which is free from stress and anxiety. It underscores the fact that the self-confident learners tend to learn better.

Community of Practice

The Community of Practice expounds that when a group of learners shares the learning experience within a community full of regular engagement and interaction, they learn better (Etienne & Wenger-Trayner, 2015)⁵. The English as a Second Language (ESL) classroom or a small group in it can be a community of practice where the teacher and learners are engaged. It is indispensable to a community of practice to sustain a shared domain, engaged members in the community, and a development of a shared practice. Further, problem-solving, requests for information, seeking experience, coordination and synergy, growing confidence, discussing developments, and mapping knowledge are some activities through which practice can be developed in communities.

Teaching-learning Methods for Learner Engagement and Experience in ELT

Language teaching possesses an evolutionary history where a plethora of work has been done by applied linguists, teachers and researchers in exploring trends and effective methods of language teaching. The knowledge of the repertoire of strategies a teacher employs, constitutes the dynamic and complex process of language teaching. The instructional process in ESL pedagogy should encompass a diversity of methods and strategies to enhance student engagement and experience. A teaching-learning method is a teaching-learning activity which aims at achieving desired competencies.

The application of teaching-learning methods is determined by the pedagogical attitude and the context-milieu, where teaching and learning take place. Traditionally, the language teaching and learning process was identified passively and centered on the teacher with an emphasis on expository methods. Today, the ESL teaching-learning paradigm contains innovative teaching-learning methods. The study of effective methods is fundamental and ever-evolving in the process of teaching, highlighting that teachers are not mere performers who follow a prescribed method, but investigators who are independent in selecting their own teaching principles. ESL teachers as informed practitioners are responsible in methodically employing the appropriate method in the right place at the

right time while ensuring the standards of teaching and learner needs, based on the repertoire of teaching-learning methods.

Current ELT Practices for Engagement and Experience in Sri Lankan Higher Education

The ESL teachers of higher education are gradually moving away from expository methods which are more teacher-centered such as lecturing because it is constantly argued and proved that student-centered methods are effective. Yet, a limited number of student engaging teaching-learning methods are being utilized. It is essential to embrace deeper approaches to learning integrated with analysis, evaluation, connections, and reflection. Such skills are associated with high-impact student engaging activities.

Mere language games such as dictogloss, bingo, etc., simple group activities like writing paragraphs, presentations, role-plays, songs and videos, and debates are inadequate for pedagogy to make learners engaged in the ESL learning process. Further, a common and recurrent issue faced by ELT practitioners is the difficulty in handling large heterogeneous classes in higher education. Though ability grouping is identified as a strategy to overcome multi-ability groups, in the case of large classes such ability grouping would not work as it creates another heterogeneous set of multiple learners. It is hard for a single teacher to teach everything within the limited time period, especially for the students who are struggling with English even after thirteen years of schooling.

In fact, technology is also a wise choice to achieve student engagement and experience. Technology is of minimal use in ELT in Sri Lanka due to the absence of proper language laboratories, teachers' insufficient understanding of technology, pedagogy, and content, technological, attitudinal, and institutional constraints as well as students from disadvantaged settings. However, technology integration into ELT is not an attempt to replace teachers with intelligent machines, as computers have no magical formulae to teach. Technology will be an effective tool to foster students' learning if employed effectively.

The epidemic situation gave sudden impetus to a conversion of traditional face-to-face classroom teaching into online teaching. As per the directive of the authority, ELT in higher education is also conducted through e-learning. There are numerous practical issues such as infrastructure facilities, access, technical support encountered by a large proportion of the student population in public higher education. In addition, the actual aims of Computer-Assisted Language Learning have not been fully understood by the teachers. It requires ESL teachers who are equipped with the theoretical and pedagogical knowledge in educational technology. Despite merely uploading study materials, interactive synchronous or a-synchronous discussion forums, chat rooms can be utilized for student discussions,

inquiries and feedback. Such communities of practice facilitate interaction and collaboration among students as well. The decision making bodies should work on uplifting the teachers' role with their maximum capacity. Nevertheless, smooth access is a prerequisite for successful e-learning.

Thus, the ELT in higher education is in need of methods that are pragmatic and with more capacity to accommodate students' opportunities for decision making, problem-solving, active collaborative engagement, analysis, synthesis, and reflection with their ownership of learning. Rather than waiting for a change, ESL practitioners can work in pursuit of practical and feasible teaching-learning methods into their pedagogy.

Panaceas for a Better Change of Sustaining Student Engagement and Experience in ELT

In the attempt of discovering an optimal means of effective, learner-centered and learner engaged culture, the post-method pedagogy has been introduced. Rethinking of the less power given to practitioners by theorists under teaching methods has given rise to alternative ways prioritizing the potential of teachers to teach autonomously through eclecticism (a mix of methods). The teachers in higher education should not take themselves into oblivion. Since teaching is not static but dynamic, it is the responsibility of tertiary level ESL teachers to adopt innovative and productive teaching-learning methods to facilitate language acquisition through learner engagement and experience. Despite the barriers such as time constraint, large classes, and heterogeneous classes which are inevitable in the current system, it is necessary to investigate alternative learner engaging methods of teaching and learning. Such an educational reform is not easy as it demands practitioners' time, iterative practice, and constant reflection. It also requires teacher expertise and commitment.

This section seeks to provide two interesting and practical teaching-learning methods, namely, peer tutoring and flipped class which embody the capacity to enhance ESL learner engagement and experience. As a majority of adult ESL learners have perceived English as a requisite for higher education and have inculcated positive and motivated attitudes towards English, they are likely to engage as voluntary participants in such novel learning experiences. As the context in which the university ESL teaching and learning occurs is underpinned by a variety of socio-cultural, educational, and psychological factors, the significance of selecting teaching-learning methods relies on practicality and student-friendliness. Thus, it is a high time to earn the maximum benefits of the below mentioned methods in tertiary ELT.

Peer Tutoring

Peer tutoring is a peer-mediated method which appeals to higher education where students can be guided to serve as academic tutors and

tutees. A peer is someone who works at the same social standing and who can be at an advanced level or a below level than the learner. The method of peer tutoring introduced by this article is with regard to 'co-peers' (Whitman, 1988)⁶ or the student partners who are also students. Peer tutoring has the potential of matching the learners who face ESL-specific difficulties with trained student tutors. There is a powerful influence of peer tutors to students and their learning through one-to-one assistance facilitated by interpersonal relationships and constant engagement. Usually, undergraduates engage in *kuppi*, an informal type of peer tutoring with the aim of a general study support within informal student networks. Peer tutoring is a formal way of engaging students in learning by interacting with more knowledgeable peers to get maximum language experience within or beyond the learning hours, under teacher guidance. It may take place either within an ESL student cohort or several in an institution.

Peer tutors are the surrogate teachers who are in possession of some training offered by their teachers. However, the tutors should be the higher performing students with proper knowledge and some level of responsibility. Conventional teachers who think teaching is their prerogative due to professional concerns will be unhappy for substitutions of learners to their roles. Such resistance to change or skepticism should be addressed by convincing teachers and highlighting the importance of peer tutoring with proper planning. In addition, peer tutors should be enlightened that every student is unique, strong and they are not incompetent. They have missed the language component at some point in their educational journey. It is important to ensure confidentiality and good relationships between tutors and tutees. Peer tutors should not tease at the learners or criticize them with others. The degree of peership will be governed by the relationship between peer tutors and tutees.

Peer tutoring can be categorized into two models to operate in ESL higher education. ESL teachers can select an appropriate model depending on their highly personal pedagogy.

First, Cross-level Peer Tutoring refers to the involvement of tutees and tutors from different age groups or levels. Usually, the older students serve as the tutors and the younger student are the tutees. For instance, second-year tutees are taught by third-year tutors. This can be done either in dyads or in small groups where one tutor reviews the language skills through activities or encourage good study habits to a group of students. However, the positions of tutor and tutee are the same under a cooperative and interactive relationship. It is important to consider student compatibility, especially in pairing.

Secondly, Same-level Peer Tutoring can be employed in terms of dyads where higher performing students are paired with lower performing students, or a division of an entire class into heterogeneous groups where they act both as tutors and tutees. Under this model, another method can be

identified as 'teacher-of-the-day' in which more knowledgeable students are required to take turns at running a session for a particular day. They should be instructed to decide upon the way to conduct sessions among a diversity of techniques such as discussions, demonstrations, using movies, songs or other engaging tasks. Such turns of teaching can be given to proficient learners in English to motivate them, avoid sporadic absenteeism, and also to increase their knowledge as well. If they are overly competitive students in the classroom, they will assist their peers with an understanding of needy students' psychological status. Further, a sense of increased responsibility is felt by them.

Nevertheless, peer tutoring needs to be underpinned by proper organization and aligned with the intended learning outcomes outlined by the teacher. Peer tutoring is equally well applied to the learner engaging and learner-centered approaches such as task-based learning, problem-based learning and project based-learning as they can be promoted by co-operative learning among peer tutors and tutees. When learners feel safe and supported by peers, their retention is likely to increase. In order to successfully incorporate peer tutoring into ELT, proper training reflecting an understanding of relationship management, positive and remedial feedback, assessment, identification of learning outcomes, proper maintenance of ethical issues and power-play should be provided to tutors. Role-playing teaching practices or micro-teaching sessions can improve their tutoring skills. If implemented properly under the constant guidance of the teacher, peer tutoring can enhance student engagement and experience with positive results as peers support not only educationally, but also emotionally.

Flipped Class

Traditional lecture-based classes in Sri Lankan higher education generally display a process where either reading materials are given in advance and students are expected to listen to a teacher presentation of similar content along with activities or just the lesson is covered in the class with some exercises. Conversely, flipped classes are divergent as they invert the conventional teaching and guide students to deeper thinking and higher levels of application.

Flipping the classroom is a resource-rich and student-centered method with a substitution of lectures with instructional materials. Students will be acquainted with instruction resources outside the classroom ahead of time and engage in high-impact inquiry-based, problem-solving and experiential learning through elaboration, exploration, and interaction during the class time based on the content of instructional materials. Generally, flipped instruction integrates technology in making the content available for students prior to a class. This can be identified as a blended learning-oriented method too. Nevertheless, the content can consist of audio/video clips, documentaries, pre-recorded lectures, ted talks, films,

articles, vocabulary, grammar rules, theory, etc. on which in-class time can be utilized for practice, inquiry, and application in a way the pedagogy addresses the needs of individual learners. Effective hands-on activities, discussions, and group projects can be utilized to facilitate student engagement and experience under this method. The teacher's primary role will be monitoring, guiding, and supporting the learner throughout in-class activities.

Flipped classes develop a flexible and independent learning space that accommodates ongoing learner engagement and experience. Flipped learning provides a collaborative learning environment for students to master the knowledge of the materials with the aid of more knowledgeable peers and the teacher through scaffolding. It will be a robust learning experience for students as they gain practice by applying prior knowledge in a diversity of pragmatic and hands-on experience or engaging in the content while interacting with others. This production-oriented learning environment will be more effective. Engaging students in problem-solving and decision-making activities, information gap activities, literature circles, and mini-projects which are derived from the principles of student-centered approaches such as task-based learning and project-based learning, content-based language learning, expose them to more inputs and makes them remember well. Such experience full of free practice with peers will help ESL learners master English not only linguistically, but also communicatively.

Summary

In summation, the afore-suggested two teaching-learning methods share humanism by providing learner-centered, learner-motivated, and stress-free language learning environments. Accordingly, the methods have the capacity to involve ESL learners actively in the learning process. Unlike traditional teaching, flipping classes and peer teaching furnish a different, but a positive experience to students while promoting intrinsic motivation. They have emerged with the aim of fostering learner engagement through high-impact and peer-supported tasks covering a broad spectrum of cognitive, social, behavioral, and affective dimensions. Peer tutoring and flipping classes are efficacious in making English an engrossing experience rather an insouciant. As the key pillars of these methods, the community of practice, ZPD, Input hypothesis, and experiential learning can be identified. In fact, it is vital to make English obligatory throughout the academic years if it is taught through such methods. Nevertheless, teachers as practitioners have to use their discretion and be autonomous in creating their own instructional design to enhance learning through engagement and experience while considering a variety of factors such as learners, their needs, skills, and the teaching and learning context. The ESL teachers should

be optimistic enough to embrace these teaching-learning methods in their idiosyncratic pedagogy.

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- ¹ Connor, J. O. (2009). Student engagement in an independent research project: The influence of cohort culture. *Journal of Advanced Academics*, 21(1), 8-38.
 - ² Kolb, D. A. (2014). *Experiential learning: Experience as the source of learning and development*. New Jersey: Prentice Hall.
 - ³ Vygotsky, L. S. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.
 - ⁴ Krashen, S. D. (1982). *Principles and practice in second language acquisition*. Oxford: Pergamon.
 - ⁵ Etienne, & Wenger-Trayner, B. (2015). *Communities of practice: A brief introduction*. Retrieved from <https://wenger-trayner.com/wp-content/uploads/2015/04/07-Brief-introduction-to-communities-of-practice.pdf>
 - ⁶ Whitman, N. (1988). *Peer Teaching: To Teach Is To Learn Twice*, ASHE-ERIC Higher Education Report No. 4. Washington, DC: Association for the Study of Higher Education.

CHAPTER 12

Peer Scaffolding to Enhance Language Learning of ESL Students

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Introduction

Throughout the language teaching and learning history, the language teachers at all levels of instructions have been interested in answering the following questions:

- ◆ How the teachers can support their learners?
- ◆ How they can help students to learn forms?
- ◆ How they can help them to use learned forms in meaning-based communication?

One useful technique to provide this support for students learning English as a Second Language (ESL) is Scaffolding. Bruner's theory of scaffolding emerged around 1976 as a part of social constructivist theory. Therefore, the language theory behind, scaffolding can be identified as social constructivism. Bruner's concept of scaffolding was particularly influenced and developed by the Russian psychologist Lev Vygotsky¹. In Vygotsky's perspective, the language learners learn best in social environments, where they construct meaning through their interaction with others.

What is more appealing to the current discussion is Bruner's view of providing scaffolding through peers, in other words, the scaffolding that takes place among the learners act as an effective way of developing their target language. Focusing on the main argument of the current discussion, the scaffolding that occurs between learners, we can consider Berkenkotter's² statement. He states that "peer response group provides a social context for peers to offer each other support and feedback".

Further, The Communicative Approach brings the argument that Communicative activities should be included in lessons in order to convey meaning. Moreover, input alone is not sufficient as the students need to interact with each other. Through this interaction, the learners can receive feedback from their peers at the moment. Thus, the students are exposed to the language and try to comprehend the meaning of the target language for

a sudden communicative purpose. In the current study, negotiation of meaning through peer scaffolding is addressed.

Negotiation of Meaning (NOM) can be defined as the process by which two or more interlocutors identify and then attempt to resolve a communication breakdown. According to the Interaction Hypothesis proposed in pedagogy, language learners negotiate in meaning which is the process of engaging in interaction in order for learners to concentrate on the form and process of the input they obtain. Further, he claims that the interaction that takes place between peers helps to create an acute second/foreign language acquisition environment where learners learn through the negotiation of meaning. Further, it is found that the learners see language as a tool for social interaction through practicing the target language in verbal skills through exchanging information and negotiation for meaning.

From the above discussion, it is evident that language learning theory posits that the scaffolding that takes place in learner-learner interactions facilitates interlanguage development. So, the second language acquisition of the students can be enhanced by encouraging peer learning in the classroom by engaging the students in group work and assigning interactive activities for them. The interactive speaking activities can be used to involve the students in the negotiation of meaning which directs the students towards better second language acquisition. Part II of this article demonstrates the use of peer scaffolding employed in an English language classroom in university context.

Description of the Learners and the Activity

Description of the Learners

Since the writer works as a lecturer at a university, her learners are adult students. They are school leavers qualified to enter the university and most of the students in the selected class are in their early twenties. The selected group of students study in the Faculty of Technology and they learn English four hours a week. With the age of the students, the teacher identified the changes and diversity in their attitude, motivation, and language competency.

Since the learners vary in their attitudes and learning styles, their interests are different. But, when considering the whole class generally, the teacher identified that her learners were interested in group activities. Once the teacher asked her students to write feedback on the group work they did in the class. More than 95% of the students had positive attitudes towards group work. Further, the students liked attractive presentations, and new language items. The students were interested in interacting with their peers and build a good rapport with their teacher. So, the students were confident enough to get their English related problems clarified, before they went out of the class.

Considering the level of the students' level of English proficiency the students are able to communicate in English. The level of language proficiency of the students can be identified as intermediate. In spite of their rural/urban dichotomy or socio-economic status, their English language proficiency was not so different. The reason for this was that the students were slightly in the same level of proficiency as they were put into classes based on a placement test held initially.

The students in the selected class had done their Advanced Level in Sinhala medium, and when they entered the university it was compulsory for them to study in English medium. With the above reason, the students have identified the importance of English and most of the students have a good attitude towards the language learning. The students who had low attitudes about the language initially, have now developed their language as they are studying English at the university, with the series of lectures conducted by the Department of English Language Teaching of the university, the students are satisfied with the improvements of their English language.

The learners of the selected class are intrinsically motivated to develop their language ability to enhance their personal language competency and social and cultural enrichment. The learners have identified the utility of English inside and outside the university. Since they are aware of that, they are instrumentally motivated to improve their language and actively participate in the classroom lessons in order to be proficient enough to face the practical needs of life.

There is no doubt that the learners in any ESL classroom have different learning styles. All kinds of learners were in the class. Visual, auditory, kinesthetic, dependent, and independent learning styles are a few of them. What is important here is that the learners' preferred learning style depends on what and when they learn. When they were engaged in a group activity, their preference was dependent on learning as they could share their ideas and knowledge. Some students were interested in role-playing activities where their whole body and mind were engaged. The personality traits affect the learners' language learning. Due to the regular learning of the language and the friendly classroom atmosphere, the students are confident in using the second language. They find it more interesting as they have peers from different language backgrounds. So, they have to use /English as a link language in order to have better communication with their friends.

Description of the Activity

Most of the learners have negative attitudes towards their language ability and they tend to underestimate their capacity. But the students can be motivated when they are engaged in interactive sessions. Since the activity selected in this study is based on peer scaffolding, the students were

enthusiastic to do the activity as they were allowed to take part in conversations.

The activity selected for this study is designed to employ Negotiation of Meaning (NOM) in an ESL setting in order to observe the effect of NOM followed by peer scaffolding on the acquisition of English. The teacher acts as a facilitator where she encourages the audience to ask questions from the narrator during the NOM session. The narrator is not disturbed during the speech, but his speech is followed by an interactive session where all the audience engage in questioning for more information, clarification of certain terms, etc.

This activity basically focuses on the skill of speaking. The objectives of the lesson are mentioned below.

Major Skill Focused	: Speaking
Objectives of the Lesson	: Developing the ability to narrate a story on a given topic Engaging in interactive conversations to negotiate meaning (asking for clarification, obtaining more information)

The procedure mentioned below gives a description on how the activity is conducted.

Table 01: Procedure of Conducting the Activity

Grouping	The students were put into groups of five.
Narrating the story	Each member of the group is supposed to narrate a story on “Technology in Ancient Sri Lanka”. The steps of the narration are mentioned below.
Step 1	Narrate the story to the group. (First audience)
Step 2	First round of the narration is followed by a Negotiation of Meaning (NOM) session.
Step 3	The narrator of the first group goes to the second group (Second audience) and narrates the story in the second round.

Evaluation of the Activity and the Reflection of the Activity by the Teacher

To illustrate the positive and negative aspects of the activity and the teacher’s understanding of the theory, it is important to pay attention on the transcripts of the activity and the teacher’s criticism on them. By examining

the transcripts of the NOM session, we can identify how the negotiation of meaning is focused on this activity. The language errors made by the student are **not** rectified in the transcripts.

Transcript - 1st Narration of the Story

Good morning everyone. Today I like to talk about king Ravana. King Ravana was a king in Sri Lanka. According to Hindu people, Ravana was born to a.. a... mmm a **wise man**. His mother is Kaikesi. He had brothers. Vibhishana, Kumbakarna, Ahiravana and brother of another wife to father. His name, Kubera. Ravana got the country from him. People say **Ravana did the country** 100 years ago the Ramayana. According to history Sri Lanka had good science and medicine on his time. **Pushpakavimana** an example. He is a great physician. His name in Hindu "Dasamukha". Rama Sethu or Rama's bridge built by Ravana. **Sri Lankan history people** tell it a floating structure connecting it to India. It is a ... a... line..in line um.. limestones. However, Ravana is a great king. Thank you!

Transcript – 2nd Narration of the Story after the NOM Session

Hi, Good morning everyone. Today I am going to tell you a story about King Ravana. **King Ravana ruled the** country for many years in the past. Even before 100 years ago Ramayana. Hindu people believe that his father is **a sage** and his name is Vishrava and his mother is Kaikesi. He had four brothers Vibhishana, Kumbakarana, Ahiravana, and Kubera. Kubera is not his own mother's son. His mmm... step, yes, his step mother's son. According to the **historians** of Sri Lanka, King Ravana was a great physician and in his ruling time, medicine and technology were very very good. For example, there is the aeroplane **Pushpakavimana**. **Commonly you know, it is Dandumonra**. **Ravana is a person with good knowledge. So, may be because of that he called "Dasamukha" by Hindus**. Thank you!

Selected Transcripts from the NOM Session Conducted Among the Learners

Abbreviations:

S - student who presented the story.

A1, A2, A3, A4, A5 - students from the audience

Transcript 01

Teacher: You said that Ravana's father was a ...

S : *Wise man!*

A1: *A sage?*

A2: Yes. Mmm...Vishrava is the name.

Transcript 02

A4: So you gave an example for technology he found.

S: Yes aeroplane.

A3: Pushpakavimana?

A4: *Some people say Dandumonara.*

Transcript 03

A1: Did Ravana live even before the time of Ramayana?

S: Yes. The historians say that he did the country for centuries.

A1: He, What?

A2: Ravana *ruled* the country.

S: Ah! Yes, Ravana *ruled* the country. (smiles)

Transcript 04

S: And, the floating bridge is also an example for technology.

A2: Can we see it even today?

A3: Yes.

S: History people say...

A1: History people?

A2: Who?

S : People study history.

Teacher : Ah, Historians!

S: Yes, yes, histoo...

A1: *Historians*

S: Yes *historians* say it connects India to Sri Lanka.

Transcript 05

A1: Why you call Dasamukha?

S : May be because he had ten heads.

A2: Ten heads! History says a different story.

S : Not ten heads?

A2 : Ten heads in the sense, he was very wise.

A1 : Knowledgeable?

S: Knowledge ..um..able?

A3 : Yes he was *knowledgeable*.

S : Ok then.

As mentioned in the first part of this study, negotiation of meaning was employed as a strategy of peer scaffolding. As the teacher needed to focus on the benefits of peer scaffolding, the teacher took a passive role in the NOM sessions, acting as a secondary audience but as a guide to the storyteller and other audience members. Thus, the main role of the teacher was to act as a facilitator to help the audience engage in a more interactive NOM session. When focusing on how the peers responded to the

storytellers and what they did to encourage the students to respond, the teacher could identify that they tried to elicit additional information on particular points that they were interested in.

How NOM has Improved the Re-telling of the Story to a New Audience

When reading the second transcript of the story, it is evident that in the second round, the student has used the new words that he learned from his friends during the NOM session. In the second narration, he substituted the words

'sage' for **'wiseman'**

'ruled' for **'did the country'**

'historians' for **'Sri Lankan history people'**

This is an example for the development of language in the morphological level

In the first narration, the student used the word **'Pushpakaimana'** and in the second round, he gives a synonym for it to make it more clarified as the previous audience needed more clarifications on the particular word. Further, in the first narration, the student did not have any idea why Hindus called Ravana, Dasamukha. But in the second round, the student explains the use of the particular word, with reasons. However, he does not use the word **'knowledgeable'**, but he says that **Ravana is a person with good knowledge.**

Comparing the use of words in the two rounds of storytelling, the teacher could observe that NOM has helped the student to present the second round of the narration clearer than the first time. However, a change in sentence patterns or grammar are not observed. But the teacher assumes that if more NOM sessions can be conducted in the future, the students would benefit as they can be exposed to the authentic use of language often.

They Engaged in NOM to;

- receive some information not provided by the storyteller - asking for the name of Ravana's father.
- identify places where cultural gaps might have confused the audience – questioning on "Dasamukha", the name given to Ravana by Hindus.
- providing help with vocabulary, that had made the storyteller's meaning unclear – giving the word 'historians' for 'history people'.

First, the students had an ear on the story told by their friend and in the NOM session, they provided the friend with correct and appropriate vocabulary and information need to make the speech clearer.

From the study conducted, the teacher could understand that Negotiation of meaning is a process that speakers go through to reach a clear understanding of each other. The change in the story told in the second

round proves the argument that learner- learner interaction is helpful in the acquisition of language.

The negative aspect of the activity is that the NOM session is limited to improve morphological level of language. As Pica (1994) states, the majority of NOM is particularly concerned with lexis, as unfamiliar words can be substituted or defined in isolation. However, the teacher should focus on scheduling future activities to enhance all language elements.

¹ Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological process*. Cambridge, MA: Harvard University Press.

² Berkenkotter, C. (1984). Student writers and their sense of authority over texts. *College Composition and Communication*, 35(3), 312-319.

Appendix I

Lesson Plan

Narrating a story on “Technology in Ancient Sri Lanka”

Class : ETCH -Group B

Duration : 45 minutes

Major skill focused : Speaking

Objectives of the lesson :

To develop the ability to narrate a story on a given topic

To Engage in interactive conversations to negotiate meaning
(asking for clarification, obtaining more information)

Procedure :

The procedure mentioned below gives a description on how the activity is conducted.

Task	Description
Grouping	The students are put in to groups of five.
Narrating the story	Each member of the group is supposed to narrate a story on “Technology in Ancient Sri Lanka”. The steps of the narration are mentioned below.

Step 1	Narrate the story to the group. (First audience)
Step 2	First round of the narration is followed by a Negotiation of Meaning (NOM) session.
Step 3	The narrator of the first group goes to the second group (Second audience) and narrate the story in the second round.

CHAPTER 13

From the Banking Concept of Education towards a Critical Pedagogy: Strategies That Enhance Student Engagement in the ESL Classroom

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Introduction

Irrespective of context, teachers of the higher education system have been facing, and are faced the challenge of engaging their students and aid them in becoming active participants in the creation of knowledge. The higher education system of Sri Lanka is no exception in this regard. The university system is faced with the challenge of facilitating student engagement which is recognized to be associated with positive learning outcomes.

Paulo Friere(2001)¹ in his book *Pedagogy of the oppressed* talks about the banking method of education as opposed to critical pedagogy. The banking concept obstructs the intellectual growth as students are mere receptors and collectors of information. The students are lack of autonomy and are inactive receptors, while the teacher becomes the depositor of knowledge. The traditional mode of the teacher teaching, while students listen passively, fall into this category.

Hence, effective critical pedagogy is when students become active participants in the learning process rather than merely absorbing the information they are given. Therefore this article aims to highlight some of the contemporary methods which are used in the education system which facilitate engagement and hence cannot be disregarded. However, limiting the teaching-learning context to these teaching strategies is not sufficient. The classroom has been limited to these strategies as lecturers are reluctant to try other methods in class due to time constraints and administrative barriers, which require them to cover the syllabus on time. The older and more experienced lecturers do not like to part with their traditional ways and resort to new methods. According to Lail², most of the lecturers use methods that they have been exposed to, or the way they were taught. This plays a major role in the way they teach students.

Thus, this article aims to offer alternative modes of pedagogic practices for facilitating student engagement, in the context of English as a second language (ESL) in Sri Lankan universities.

***Kaduwa* (English as a Sword): Ideological Implications of Language in the ESL Classroom.**

According to Rambukwella³, many scholars contend that English has long been identified as a marker of class privilege, a tool which guaranteed different kinds of social and economic privileges. Kandiah⁴ coined the term *kaduwa* to highlight how English provided various forms of privileges to its users while creating a rift between users and non-users of English.

It was a term used by non-English speakers to describe anger, frustration they experience in relation to English. Thus, came into existence among university undergraduates phrases like *kadu panthi* (English classes) and *kadden kotanawa* (talking in English). Thus, it is important to remember that these ideological implications are present in the language classroom. It is due to these ideologies that teachers fail to engage students, and students may lack interest in learning. Therefore we hear complaints such as the students don't talk in the class or that they never come for classes, or that they do not prioritize English like the other courses. Thus, the task of engaging students becomes a laborious task.

Theoretical Basis of Student Engagement

According to Bryson & Hand⁵, two key components to engage students are a good content coupled with effective teaching strategies. Thus effective teaching methods can facilitate student engagement, and engaged students develop positive attitudes which in turn produces good learners. Accordingly, it can be argued that it is essential to reconsider these educational procedures and to have alternative models for teaching purposes⁶.

Traditional and Non-Traditional Teaching Strategies

Strategies are systems, methods, or techniques that a teacher uses during giving instructions to assist student learning. They can be categorized as traditional and non-traditional⁷

The traditional strategy of teaching or the banking method of education is where the lecturer talks and students listen. Students prefer this lecture strategy for the fear of being laughed at, or making mistakes. They like to be passive since they feel comfortable. Non-traditional strategies refer to active learning strategies which engage students. They are active participants in the construction of knowledge.

Non-Traditional Strategies Used in the ESL Classroom that Facilitate Engagement.

Teaching strategies that engage students is not a novel concept in the ESL classroom. They have been used in teaching English in Sri Lankan universities. Some of these instructional procedures which have been and are currently used in teaching English are given below. In all the techniques given below, the teacher plays the role of the facilitator, spectator, and participant. However, as mentioned before these techniques though they play a vital role in enhancing student engagement, are insufficient to address the needs of the hour.

Brainstorming

In this technique, students are divided into groups to generate information on a particular topic. It promotes creativity and imagination. Students are given the freedom to freely express their ideas and rich information is generated in this context.

Cooperative Learning

In this instructional procedure, students work together in small groups on a particular topic. As opposed to competitive and individualistic learning, students work cooperatively with peers to accomplish shared educational goals.

Language Games

Games are used as fun and interactive ways of engaging students. These help to break the monotony of the class and enhances motivation while enabling the acquisition of different skills of the language.

Role Plays

Students are divided into groups or pairs and assigned with different roles in relation to the topic. It adds a variety and opportunities for language production. In the language classroom, this strategy is used to promote fluency and speaking.

Oral Presentations and Projects

This pedagogical practice, especially group presentations helps to lower the affective filter of students and can help students feel less anxious and nervous amidst their colleagues. It generates new knowledge as working in a group promotes collaboration and language acquisition.

Learning Management System (LMS)

A learning management system(LMS) is an e-learning platform for digital learning used in the higher education system. It enables lecturers and

students to move away from traditional blackboard teaching to a more engaging and interactive teaching-learning experience through the use of technology. This collaborative online platform promotes the concept of blended learning which is a combination of online learning through audios, videos, online activities, and face-to-face learning. Via LMS the lecturer can give online assessments, give feedback, as well as track student attendance and participation.

Alternative Modes of Instruction which can be used in the ESL Classroom to Facilitate Engagement

Peer Scaffolding

This is a theory proposed by the psychologist Lev Vygotsky, is achieved through pair and group work. While students learn from the teacher students feel more comfortable to learn from their more 'capable' peers. Although this practice prevalent in the class it is not encouraged by teachers as the students have to remain silent and talking with peers is not encouraged. Therefore, to make the classroom a friendly learning environment, the teacher should encourage students to talk to their peers and get help when necessary. The lecturer should encourage students to solve their problems, or clarify content-based misunderstandings with the support of their peers. Obtaining assistance from the lecturer should be presented as the last option. The usual practice of the English class however is limited to the lecturer grouping the students and instructing them to work. This is not a successful mechanism and this does not produce a cooperative effort. Further, Slavin⁸ emphasized that, when properly organized, students in collaborative learning groups make sure that everyone in the group has mastered the subject content. A grading system can be introduced for a pair and group work to confirm that all members of the group participate in the assigned task. The lecturer, based on the needs of the class, can explain to students how peer or group discussions should operate and how grading will occur. Based on the requirement, the lecturer can also assign roles to members of each group to make sure that none of the members are isolated.

Peer Teaching

Peer teaching at the college level takes many different forms. Surrogate teaching, common at Sri Lankan universities, involves giving to a batch/ group of undergraduates, academic aid for courses, usually by a fellow senior student. *Kuppi* is the term used and it is a common occurrence. Usually, there is a tutor and a group of tutees. This practice can be brought into the classroom. The teacher can act as a facilitator, and supervisor to see that the correct content is being delivered.

This idea was adopted from a case study of Sunggingwati⁹ in teaching English as a foreign language EFL context in Indonesia. This can adapted to the Sri Lankan ESL classroom with a class of about 30 students. Initially,

students can be divided into small groups. Each member can practice peer teaching to their group for about 10 minutes. Peers will provide feedback. In addition, personal experience can be gathered by the student regarding peer teaching. Next, students can do peer teaching to a larger group and the same practice follows. Finally, each member receives a chance to teach the whole class. This helps in developing the confidence, improving presentation and teaching skills, mastery of the assigned lesson material, and interaction with peers which leads to an engaged experience in the classroom.

Peer Assessment

Peer assessment can be incorporated into the ESL classroom. In this method group members can assess the quantity and quality of their own as well as evaluate others' contributions. The teacher can design a grading system and inform students how peer assessment will influence when giving individual grades. Grades will motivate the students to engage in class. However, the lecturer must not let peer grading influence a student's final grade.

Use of Flipped Classroom Technology

As opposed to the educational model of blended learning, according to Bergmann & Sams¹⁰, flipped classroom is a pedagogical model where the lecture and the homework elements of the course are reversed. In this technology, less time is spent on explaining the theoretical basis and more time is allocated for practical activities. Thus, the lecturer can upload a video explaining the theory of a particular lesson and providing homework to students based on the topic. In class, they have the freedom to discuss about the more practical aspects of the learning process, or any issues related to the particular topic. According to Marsh¹¹, this e-learning platform encourages collaboration among students due to group work. Students are also engaged in peer-to-peer assessment, and giving feedback to their peers according to specific criteria. Thus, students cooperate, learn from each other, and help each other. It is the responsibility of the lecturer to include activities which promote the interaction of students with each other.

Conclusion

Thus, these alternatives namely, peer scaffolding, peer teaching, peer assessment, and the use of flipped classroom technology, can be utilized in the classroom to bridge the gap between traditional and non-traditional teaching strategies. These techniques aid in promoting a more positive, learner-centered, and engaging experience for the learners.

¹ Freire, P. (2000). *Pedagogy of the oppressed*. London: Bloomsbury Publishing.

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- ² Lail, A. A. (2009). Are new faculty prepared to teach diverse learners? *Inquiry*, 14(1), 29-40.
- ³ Rambukwella, H. (2018). Standard English, cricket, nationalism and tyrannies of writing in Sri Lanka. In C. Weth and K. Juffermans (Eds), *Tyrannies of the Written Word*, (pp.113-128) London: Bloomsbury Academic Press.
- ⁴ Kandiah, T. (1984) "Kaduva": Power and the English language weapon in Sri Lanka. In P. Colin-Thome, & A. Halpe, *Honouring E.F.C Ludowyk: Felicitations Essays* (pp117-154). Colombo: Tisara Prakashakayo.
- ⁵ Bryson, C., & Hand, L. (2007). The role of engagement in inspiring teaching and learning. *Innovations in Education and Teaching International*, 44(4), 349-362. doi: 10.1080/14703290701602748
- ⁶ Bullough, R. V. (2002). Rethinking field experiences: Partnership teaching vs. single-placement teaching. *The Journal of Teacher Education*, 53(1), 68–80.
- ⁷ Wandberg, R. and Rohwer, J. (2010) *Active Teaching Strategies and Learning Activities. Teaching Health Education: In Language and Diverse Classrooms Learning*. Jones & Bartlett. (p:162186). Retrieved from:http://samples.jbpub.com/9780763749453/49451_CH09_FINAL.pdf
- ⁸ Slavin, R. E. (1995). *Cooperative learning: Theory, research, and practice*. Boston: Allyn and Bacon.
- ⁹ Sunggingwati, D. (2018). Cooperative learning in peer teaching: A case study in an EFL context. *Indonesian Journal of Applied Linguistics*, 8(1), pp. 149-157. doi:10.17509/ijal.v8i1.11475
- ¹⁰ Bergmann, J., & Sams, A. (2012). *Flip Your Classroom: Reach Every Student in Every Class Every Day*. Arlington: International Society for Technology in Education.
- ¹¹ Marsh, D. (2012). *Blended Learning. Creating Learning Opportunities for Language Learners*. New York: Cambridge University Press.

Section 04

Promoting Engagement and Experience in Science & Technology Disciplines

CHAPTER 14

**Challenges in Effective Learner Engagement in Bachelor of
Engineering Technology Degree Programmes in Sri Lanka**

Shyama Wickramasinghe

CHAPTER 15

**Enhancing Learner Engagement and Experience in Engineering
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K. P. M. Priyankara

CHAPTER 16

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Students to Improve Local Healthcare**

K. M. D. G. Dilini N. Kekulandara

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A. N. Madusanka

CHAPTER 14

Challenges in Effective Learner Engagement in Bachelor of Engineering Technology Degree Programmes in Sri Lanka

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Engineering Technology Degree Programmes in Sri Lanka

Engineering Technology (ET) is a new stream introduced, recently, to the Sri Lankan University System and currently, there are nine Technology Faculties that offer ET Degrees, under the purview of University Grants Commission (UGC), Sri Lanka. These faculties will soon produce their first batches of ET Graduates. University of Vocational Technology (UNIVOTEC), which can be identified as the first move in Sri Lanka to offer ET Degrees, was established in 2008, opening a path for technicians to obtain degree-level educational qualifications.

ET can, therefore, be identified as a relatively new stream for Sri Lanka and it is vital to have a conversation on ET Degree Programmes among the general public in the country. The discussion has to be extended to academics, educationalists and engineering professionals focussing more on the course contents, industrial training, teaching methods etc. Majority of the ET Graduates will enter the technology industry as “Engineering Technologists” and their role will indeed, be new to all.

Technical Proficiency can be defined as the ability to apply technical knowledge and skills required in a specialist and professional job role to achieve expected outputs. There is a broad spectrum of technology-related job roles ranging from carrying out basic or routine tasks under supervision and technical direction to the application of scientific theories to find solutions to technical issues. Each distinct position in this spectrum requires a certain level of Technical Proficiency. Persons, who play different roles in the spectrum shown in Table 1, are the members of a single team that can be named as “Engineering Team”. As depicted in Table 1, Engineers involve in the application of scientific theories to find solutions to technical issues, optimising the resources and they are more oriented towards scientific theories and mathematics. Technical Officers and Technicians are the persons who carry out the work as per the direction of the Engineers. They need lesser knowledge of mathematics and natural sciences. Engineering

Technologists will have to play a new role in an Engineering Team and they fill the gap between Engineers and Technical Officers. An Engineering Technologist must, therefore, have to have theoretical knowledge as well as knowledge on practical applications. Engineering degree programs typically require additional, higher-level mathematics, including multiple semesters of calculus and calculus-based theoretical science modules, while engineering technology degree programs typically focus on algebra, trigonometry, applied calculus, and other courses that are more practical than theoretical in nature.

ET Degree course, in general, shall be capable of producing graduates with balanced knowledge on theory, mathematics and practical applications. Some components that enable students to gain hands-on experience are, therefore, essential for an Engineering Technology Degree programme.

Table 1: Position of Engineering Technologists in Technical Spectrum

Job Role	Anticipated Educational Qualifications	Responsibility
Engineering Scientist	Postgraduate Qualifications in Engineering/ Applied Sciences	Creates New Knowledge on Engineering
Engineer	Bachelor of Engineering, Bachelor of Science of Engineering	Applies Scientific Theories to find solutions to technical issues
Engineering Technologist	Bachelor of Engineering Technology, Bachelor of Technology	Implements Engineering Solutions
Technical Officer	Higher Diploma/ Diploma/ Certificate in Technology	Supervisory Role
Technician	Basic Vocational Education	Carrying out routine tasks

Significance of Learner Engagement

Learner Engagement is often considered as a measure of a potentially successful student-centred learning process. And it is the key measure of learners' participation in both qualitatively and quantitatively, in all aspects of their study programme. It also represents the learner's interaction with teachers and his/ her co-workers. Significant attention has been paid to student engagement since the early stages of research on education. Behavioural Engagement, Emotional Engagement and Cognitive Engagement have been identified as the three dimensions of engagement, since then. The three dimensions of engagement can be defined as follows.

- *Behavioural Engagement:* Draws on the idea of participation and includes student's participation in education (including the academic, social and extracurricular activities) and this is vital for achieving positive academic outcomes and for preventing dropping out from academic work.
- *Emotional Engagement:* Conveys the idea of the sense of belonging or connectedness to the educational institution and includes students' emotional reactions in the classroom and the institution. This is important as it creates a willingness to work.
- *Cognitive Engagement:* Draws the idea of student's investment in his/ her learning. It exerts the motivation and effort required to comprehend complex ideas.

Research work has revealed that these dimensions overlap each other and it is frequently highlighted that when a learner is engaged on one particular dimension, but not on the others, his/ her performance and knowledge retention are in a weak position.

Learner Engagement in ET Undergraduate Programmes

UNIVOTEC and the Faculties of Technology under UGC are the two main types of first degree awarding institutions for ET in Sri Lanka. Strategies of teaching for UNIVOTEC students can be different, as it mainly focuses on teaching for persons with certain technical competence and on the other hand, age ranges of UNIVOTEC undergraduates may fall in a wider range. Learner engagement in the Faculties of Technology under UGC shall, therefore, be discussed separately from the UNIVOTEC students. For the scope of this article, learner engagement of the Bachelor of Engineering Technology (BET) undergraduates of the universities under UGC is considered.

Students, who have passed their G.C.E. Advanced Level Examination in Engineering Technology Stream, become eligible to enter for BET degree programmes under UGC. Based on their preference and merit in G.C.E. Advanced Level Examination, students are selected for degree programmes. Engineering Technology and Science for Technology are the two compulsory subjects they follow for their Advanced Level Examination while they can opt for another subject from among Economics, Geography, Home Economics, English, Communication and Media Studies, Information and Communication Technology, Art, Business Studies, Agricultural Science, Accountancy and Mathematics¹.

In the present article, a SWOT Analysis is carried out for identifying challenges met by Technology Faculties in learner engagement and probable paths to meet the challenges. Then, it is expected to discuss the barriers to

develop the three dimensions of learner engagement. 5E Instructional Model is later discussed as a way to improve student engagement in Technology Faculties.

SWOT Analysis

SWOT stands for “Strengths, Weaknesses, Opportunities and Threats”. SWOT Analysis is a simple but powerful method to analyse and identify the merits and demerits of a certain institution. The SWOT Analysis carried out for learner engagement in Technology Faculties in Sri Lanka is shown in Table 2 and a summary of the analysis is depicted in Figure 1.

Due to insufficient English knowledge, the gap between Advanced Level knowledge and degree level knowledge and poor mathematical skills, a student may experience a tiresome and complex learning environment at the university. These factors can seriously affect student’s participation in the learning process and they can indeed damage his/ her sense of connectedness to the classroom, with consequent effects to the behavioural and emotional engagement of the student.

Table 2: SWOT Analysis of Student Engagement in Technology Faculties in Sri Lanka

Strengths (S)	<p><i>Flexibility to develop a new learning culture</i></p> <p>Every faculty in a university has its own learning culture and it is very difficult to change such cultures later on due to the inertia of the faculty structure for such change. Attitudes, behavioural patterns etc. of the lecturers, students and administration are the key barriers for changing the learning culture. Being new faculties, Faculties of Technology has its own strength of starting new positive learning cultures with enhanced learner engagement.</p>
	<p><i>Small age gap between lecturers and students</i></p> <p>Majority of the lecturers of the Faculties of Technology are in the age range of 25 – 35 years. This comparatively younger staff has facilitated to reduce the gaps between the teachers and learners, creating a suitable environment for effective two-way communication</p>
	<p><i>Practical Skills of the Students</i></p> <p>An ET Degree course has a practical bias compared to an Engineering Degree course and students with practical skills would pay more attention to the course. Majority of the students who select Engineering Technology for their G.C.E. Advanced Level are the students who are oriented towards practical applications rather than theoretical analyses. Majority of the students, who are selected for ET Degree programmes, are therefore equipped with practical skills, too. This is one of the main reasons to encourage engagement of the students to the course.</p>

Insufficient English knowledge of the students

The medium of instruction for all the modules in ET Degree courses in Sri Lanka is English. All the formal instructions are given in both theory and practical sessions, in English and students are expected to communicate with lecturers and demonstrators in English. Status of English language capability is insufficient and grasping the delivery during a lecture is consequently retarded. It, in turn, prevents students' responses to the lecturer.

Gap between Advanced Level knowledge and degree level knowledge

Engineering Technology introduced to selected Sri Lankan schools in 2013, is a new stream for G.C.E. Advanced Level. Some students still face difficulties due to the lack of qualified teachers, relevant laboratory facilities, in their schools. Even though some students get through their G.C.E. Advanced Level Examination and become selected to follow BET Degrees, they have to lag behind the pre-requisite knowledge during their conduct in the university. This knowledge gap between Advanced Level and degree level discourages the students' engagement.

Poor mathematical skills of the students

When subject combinations done for their Advanced Level by ET undergraduates were concerned, it is noted that the majority of the students have opted out of Mathematics. As a result, they have been losing their skill of solving mathematical problems, till they enter the university. Mathematics and other subjects that require a certain amount of mathematics, hence, become complex subjects for such students affecting their willingness to learn the subjects.

Unclear career path

Since Engineering Technologists are new to the Technical Spectrum in Sri Lanka and even ET undergraduates do not have a clear idea on their future job role. Most of the students do not have any idea about the capabilities they require and therefore, an enthusiasm for the course content is not built among the students.

Less number of experienced lecturers

Many of the Technology Faculties have a shortage of senior/experienced lecturers and service of experienced lecturers are required when teaching the subjects with a practical bias. On the other hand for the supervision of undergraduate research projects, it is important to have Senior Lecturers with relevant post-graduate qualifications.

Opportunities (O)	<i>Interactions with industry</i>
	<p>Interaction with industry and industry experts is often encouraged in BET degree programmes and such interactions are vital for enhancing the enthusiasm of the students. Workshops, guest lectures on practical applications with the participation of industry experts and industrial visits can be identified as opportunities for growing interest to learn.</p>
Threats (T)	<i>Integrations with academics</i>
	<p>Interactions with the academics of Science/ Applied Science Faculties and Engineering Faculties will allow the students to acquire a wide range of knowledge and this can be identified as another notable opportunity to enhance learner engagement.</p>
	<i>Large-sized student groups for classes</i>
Threats (T)	<p>Due to time constraints, it is a common incident to see large-sized student groups, for theory and practical sessions. Limiting the number of students per group is very important in order for the students to get hands-on experience during practical sessions. When the number of students per group becomes lesser, the ability to pay individual attention to the students would be higher.</p>
	<i>Common lectures for the students of different disciplines</i>
	<p>When students from different disciplines have the same module, it is sometimes easy and time-saving to schedule common lectures and common practical sessions for all. If the module is more relevant to one field, the students from the relevant field may have a higher capacity of understating than the other. Then, it would be difficult for the lecturer to teach due to unbalanced grasping capacity of the students.</p>
Threats (T)	<i>Obligation to meet curriculum</i>
	<p>The lecturer must cover the entire syllabus of the module during the limited number of weeks and the limited number of hours assigned for the module. If more attention is paid to complete the topics, it will be difficult to pay attention to individuals, allow sufficient time for the students to express their views and concerns and to have better two-way communication with the students and the lecturer.</p>

When the students do not have a clear idea on their future career path, they do not motivate to engage in learning and as a result, the cognitive engagement is not developed among students. Senior and experienced lecturers are also needed to inculcate keenness to acquire capabilities that require producing a professional engineering technologist. Cognitive engagement is again encouraged with the developed keenness.

If a lecturer pays more attention to complete the topics in the curriculum then he/ she will get very fewer chances to engage the learner

well with him/ her. When a lecturer has sufficient time to describe on other matters to enhance students' positive attitudes on their future carrier, their cognitive engagement is also improved significantly. Large-sized student groups for classes and having common lectures for the students of different disciplines are also barriers for behavioural and emotional engagement of the students, as the students feel that they are marginalised in classrooms.

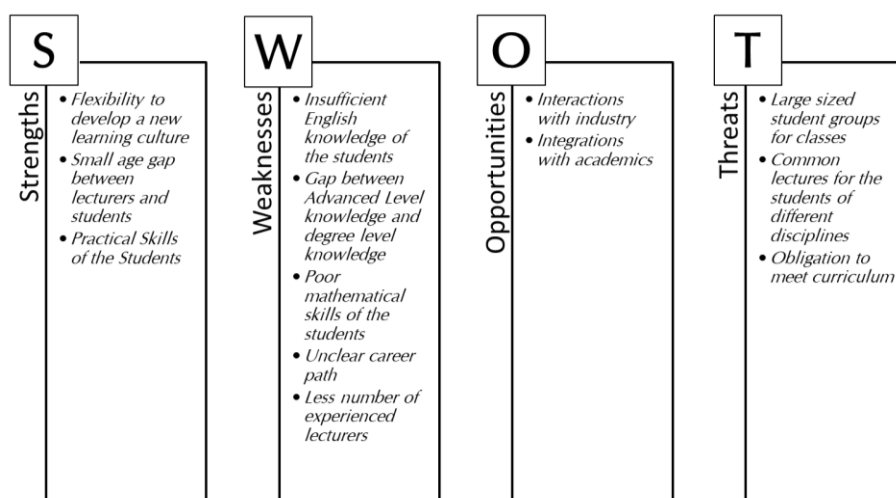


Figure 1: Summary of SWOT Analysis

5E Instructional Model in STEM Education

ET education can be identified as a subset of so-called STEM Education. STEM is abbreviated as “Science, Technology, Engineering and Mathematics” and STEM Education is discussed as a separate division as there are many common characteristics in teaching them. 5E Instructional Model is a concept often referred with the design of STEM Education and it can definitely, be applied to ET Education, too. 5E stands for five phases of the learning process namely, Engage, Explore, Explain, Elaborate and Evaluate and this model is applied in various forms to discuss the design and implementation of STEM instruction.

Though “Engage” is just one of the five phases of the process, the entire model has recently been reviewed as a basic model for Learner Engagement in STEM education when looked at the model from a student-centred perspective. The five phases of the 5E Instructional Model are designed to facilitate the process of conceptual change helping the STEM teachers to make decisions interacting with learners. The model connects different teaching strategies and educational activities.

The five phases of the model can be defined briefly as follows from a learner-centred perspective.

- *Engage* - Teacher works to understand the prior knowledge of the students and any knowledge gaps are also identified. In this phase, it is important to develop an enthusiasm in lessons to be taught in such a way that the learners become eager to learn.
- *Explore* - The learners participate in an activity that facilitates conceptual change. This phase allows the students to get hands-on experience on the concept, while actively exploring the concept through concrete learning practices. The learners are asked to communicate with their colleagues to make observations and it facilitates conceptual change.
- *Explain* - This phase can be identified as a teacher-led phase and the teacher may ask the students to share what they have gained during the Explore Phase. The technical information can then be presented in a comparatively direct manner helping the learners to synthesize the new concepts and ask questions if they need further clarifications. During this phase, the teacher may use still photographs, videos, animations or any other teaching aid to boost the understanding.
- *Elaborate* - During this phase, the learners are allowed to reinforce their knowledge before evaluation. The learners are given space to apply what they have learnt, enabling deeper understanding. The teachers may ask to demonstrate a practical application or conduct presentations to cement the skills.
- *Evaluate* - This phase allows a teacher to observe whether his/her students have grasped the core concepts completely. It is also useful to see whether the learners apply the concept differently. Both formal and informal assessments can be used in this phase while self-assessments, peer-assessments, written assignments, quizzes and examinations are other helpful modes of assessment.

5E model was initially developed as a linear model and it was later stressed by the various researchers, the importance of modifying the model as a cyclic model. In recent researches, the 5E model has been discussed in combination with the Flipped Classroom concept. Flipped Classroom is an instructional strategy with two components: (1) Individual learning component outside the classroom (2) Interactive group learning component inside the classroom. When the 5E Instructional Model is coupled with the Flipped Classroom concept, the five phases of the model are divided among the in-class and out of class components. The division of the five phases among the two components has been done differently by various

researchers. A typical 5E model in combination with flipped classroom can, however, be represented as shown in Figure 2.

In the model shown in Figure 2, phases, Engage, Explain and Evaluate are common to both in-class and out of class components. Elaborate phase belongs to the in-class component while phases, Explore belongs to out of the class component.

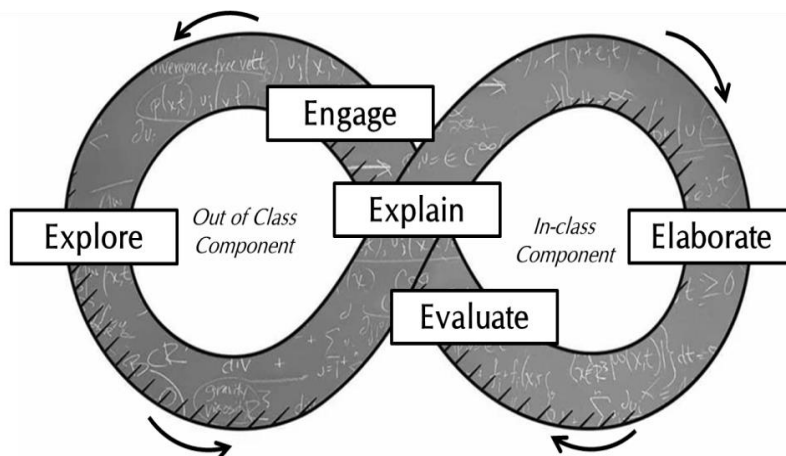


Figure 2: Flipped Classroom Combined with the 5E Instructional Model

Suggestions

Negating the weaknesses and reducing the effect of threats while enhancing the strengths and increasing the effect of opportunities is the way to enhance the learner engagement of BET undergraduates in Sri Lanka. Incorporation of the 5E instructional model in a flipped classroom can create a rapid change to minimise the effect of threats and weaknesses.

Unsatisfactory English, mathematics and pre-requisite subject knowledge can, in general, be identified as “knowledge gaps” of the students. It can be expected that the problems in schools like shortage of qualified teachers will be solved within several years, as there are programmes in progress to recruit and train teachers for the Technology Stream in G.C.E. Advanced Level. However, for several years, there will be a significant influence on the basic knowledge of ET undergraduates until the problems are duly solved.

It is, therefore, suggested to have a foundation programme just after the students’ admission to the faculties and before the start of their academic semesters. This programme can be designed for a period about three months and it is proposed, first, to identify the insufficiencies of students, during the programme. It shall include classes of English, mathematics and selected pre-requisite subject knowledge. It is also required to have certain programmes to educate the student on their role in the technical field. Some

collaboration with the industry professionals is also important for the foundation programme, in order to create a good impression on their profession and to generate self-importance among the students.

Reducing the gap between the lecturers and students can be noted as the key method to emotionally engage students with the faculty. Appointing young lecturers as mentors to student groups can be an effective way to identify the needs of the students and the teachers can then have a good idea to plan their lessons easily to inspire the students. This will also help to create a fresh and effective learning culture within the faculties. It is important to couple the theory sessions with practical applications whenever possible to motivate the majority of the students with a practical bias. 5E instructional model in a flipped classroom can be used as the key in creating a unique teaching philosophy for growing up Technology Faculties in Sri Lanka.

Engaging experienced lecturers with relevant postgraduate qualifications and industry professionals as much as possible as visiting/guest lecturers shall also be encouraged. It is good to increase the number of industrial visits to observe the state of the art applications.

It can be a difficult task for the course coordinator to divide the students into smaller groups due to time limitations. It is, however, essential to give an effort to avoid large-sized student groups for classes. Avoiding common lectures for the students of different disciplines is also worthy despite all the restraints. It is worthwhile to reserve adequate time to discuss with the students, allowing students to talk and express their concerns and to motivate the students towards their engagement with the learning process. Unlike in traditional text-based lecture-style teaching flipped classrooms with the 5E model will save time for in-class activities, allowing sufficient time for lecturers to deal with the students.

In conclusion, the 5E Instructional model used in STEM education can also be used as a useful tool, to enhance learner engagement in Technology Faculties of Sri Lanka. Since the curriculum in ET is a combination of theoretical and practical components, implementation of the 5E model is relatively easy. Strengths of students such as practical skills can be considered as merits to implement the model. During Explore phase students with less practical bias can be inducted for a conceptual change by the practical skills of the majority. Being young faculties, Faculties of Technology in Sri Lanka has less inertia to move for fresh and novel teaching and learning cultures, winning the challenges in effective learner engagement in their undergraduate programmes.

¹ Admission to Undergraduate Courses of the Universities in Sri Lanka, Academic Year 2018/ 2019 (Based on the GCE (A/L) Examination 2018), UGC, Sri Lanka

CHAPTER 15

Enhancing Learner Engagement and Experience in Engineering Technology Undergraduates, Sri Lanka

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Introduction

Engineering technology is a newly added stream to the Sri Lankan higher education system which was established about four years ago in the Sri Lankan university system. This stream is spread over the Sri Lankan universities which cover the majority of main universities throughout the country. Since the engineering technology faculties started very recently, the whole system is under a developing period. The rapid development of such a system will be quickly established a well-recognized job title within the country. This article will be discussed the enhancement of learner engagement and experience of Engineering Technology undergraduates in state universities in Sri Lanka.

Teaching-Learning Methods, Strategies, and Approaches

Use of different teaching methods, strategies, and approaches results development of better mindsets rather than practicing the same method continuously, but it would be highly valuable to find out the most appropriate teaching method for a specific area of teaching. The correct way of teaching will enhance student engagement. At the same time, the favorable response of the students may also influence the teacher in teaching. Since the engineering undergraduates are keen on new technology, they may grab different teaching methods as well as the teachers may able to use new information technological methods when teaching according to a better lesson plan.

There are numerous teaching approaches that are currently used in adult teaching-learning activities. Multiple intelligence learning is identified as an approach that is used for children. But it is proven that multiple intelligence learning can be effectively used for adults too¹. The use of such a method may influence the learners who are isolated from the majority.

Students Life and Culture

Since engineering technology undergraduates come under government universities, they enjoy their academic life with other activities

such as sports, engage with authorized societies, do their own research works, participate in exhibitions, etc. Special in sports activities, government universities supply most of the essential resources for every student who follows the sport. It is better to have a balanced university life with other activities other than isolating with only academic activities. It will be helpful to have a clear mindset for learning activities too. Also found that the use of field activities in appropriate courses may be one method to enhance, both affectively and cognitively².



Figure 3: Multiple Intelligences

Generally, the undergraduates work together with their own culture which is bound with their university life. They always maintain their style in different situations as a group. Engage with good cultural habits may result in a clear mindset to work.

Assessments

Assessment can provide a framework in which educational objectives reflect³. Then the assessment is a very important part of any course. Thus, the assessment can be divided into categories such as formative and summative assessments where both of these assessment methods are used in the engineering technology stream. Most probably the summative assessment marks are taken a major portion of marks in such stream. But it is shown that summative assignments can be ended up with incorrect outputs due to failure of technique and disarray of assessment

purpose where due to that students who follow the course may end up with some disengagement of learning. Then, it is found that a change of the technique or the curriculum is better to have good outputs⁴.

When assessing the students, it is important to consider the self-knowledge in some specific areas. Self-knowledge is a critically important component of metacognitive knowledge⁵. Since the engineering technology students go through more complex theories, it is easy to check the self-knowledge and it influences the students to work.

Infrastructure

A learning infrastructure can be identified as a set of resources that support the environments for learning. Then, teaching can be identified as a part of a learning infrastructure that makes both teaching and learning facilities into a common title. Since the engineering technology learning content includes more technological and practical stuff, the laboratory facilities in the faculties takes a major part when compared with other faculties. Since the faculties are so young, the laboratory facilities are still in the developing stage. If such facilities are enhanced, student engagement and the preference for learning will be rich.

Lecture theaters, laboratories, and human resource are common physical resources where a digital resource such as e-learning is becoming more popular and successful learning tool which can be effectively used for distance learning. It is found that providing more technological facilities with e-learning would increase the positive attitude of university students to learn⁶. Since technology students are more familiar with digital equipment, e-learning will be effectively influenced the learner engagement at the undergraduate level.

Curriculum

Some parts of the curriculum, which are followed by the engineering technology students at the university, are in line with the engineering stream in Sri Lanka. But the initial knowledge level of engineering technology students after the advanced level examination in specific areas is not that strong to gather all the contents. It gives a more challenging teaching environment for the lecturers at the universities. Also, it makes a challenging learning environment for the learners. Most of the time, better preparation with a proper teaching plan may helpful when facing this challenge.

At the same time, the engineering stream flow parallel to the engineering stream in Sri Lanka, but the graduates will not call engineers. Most probably they may call as technologists. However, the job title is still not fixed since no engineering technology graduate has been exposed to the industry through a job carrier. The undergraduates doubt whether they will get or will not get a proper job. Due to this misalignment, sometimes the students are discouraged to follow the courses. These types of issues make a

more complex teaching environment which demands the teachers to do more other than engaging with teaching. At the same time it valid for the students too.



**Figure 2: Improvement of Laboratory Facilities, Physics Laboratory-
Department of Mechanical and Manufacturing Technology - Faculty of
Technology - WUSL**

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- ¹ Arce, P. A. (2006). Learning futures: Using multiple intelligence theory for adult learners. *Futurics*, 30(3/4), 89.
 - ² Kern, E. L., & Carpenter, J. R. (1986). Effect of field activities on student learning. *Journal of Geological Education*, 34(3), 180-183. doi: 10.5408/0022-1368-34.3.180.
 - ³ Black, P. J. (1993). Formative and summative assessment by teachers. *Studies in Science Education*, 21, 49–97. doi: 10.1080/03057269308560014.
 - ⁴ Knight, P. T. (2002). Summative assessment in higher education: Practices in disarray. *Studies in Higher Education*, 27(3), 275-286. doi: 10.1080/03075070220000662.
 - ⁵ Pintrich, P. R. (2002). The role of metacognitive knowledge in learning, teaching, and assessing. *Theory into Practice*, 41(4), 219-225. doi: 10.1111/j.1440-1754.1991.tb00400.x.
 - ⁶ Vidanagama, D. U. (2016). Acceptance of E-Learning among Undergraduates of Computing Degrees in Sri Lanka. *International Journal of Modern Education & Computer Science*, 8(4). doi: 10.5815/ijmecs.2016.04.04.

CHAPTER 16

New Approaches in Teaching Biochemistry for Medical Students to Improve Local Healthcare

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Significance of Biochemistry to Medical Students

As the word implies biochemistry is a combined science of chemistry and biology. Biochemistry is known as a discipline with a long history. In Indian history, it has been well documented even from ancient times, the understanding of biochemistry was practiced. The metabolic and genetic basis of diseases had been identified to treat different diseases. For example, Charaka, the great master of Indian medicine, has mentioned in his dissertation that madhumeha which is known as diabetes mellitus in modern medicine, is caused by metabolic alterations of carbohydrates and fats. This is considered as a strong evidence that supports the historical existence of biochemistry.

Today, biochemistry has become a vital component of medical science. It is taught for medical students to fulfill three major objectives.

1. To explain the biochemical basis of diseases and human biology
2. To understand the basis of laboratory investigations
3. To interpret and apply results of the laboratory investigations in diagnosis and management of diseases

Moreover, biochemistry is also considered as the research language of medicine. The tools for research in medical science are based on the principles of biochemistry. The study of biochemistry is essential to understand new research outputs in medicine. Overall, biochemistry will give the basic information regarding the functioning of biochemical components at the molecular level, such as, how the food and nutrients are digested, absorbed, and used to make the building blocks of the macromolecules, how does the body derive energy from food, what is the function of genes and their expression, and also what is the molecular basis for immunological resistance against invading organisms.

The worldwide medical practice is highly dependent on laboratory analysis. Therefore, one of the main objectives of teaching biochemistry to

medical students is to get them exposed to evaluate laboratory analysis of body fluids, especially the blood and urine. Therefore, the biochemistry curriculum is designed to be taught in two parts: practical component and theoretical component. This practical component of biochemistry is taught by giving hands-on laboratory experience to the students according to the traditional methods. However, medical educators around the world have identified teaching the theoretical components of biochemistry requires more advanced and organized approaches.

Traditionally, preclinical disciplines such as biochemistry are taught in the early years of the medical degree. There is a worldwide concern among medical educators that this basic science knowledge of biochemistry learned during the preclinical years has significantly lost when students reach their clinical years. Due to this reason, medical educators around the world are experimenting on better approaches to teach biochemistry to medical students.

Evolution of Biochemistry in Medical Curriculum

Medical education in Sri Lanka is considered as a professional education where students are trained for a specific profession. When compared to general undergraduate education in the arts and sciences, medical education requires the development of different attributes. Some of the desirable attributes include physical skills, reflective behavior, reliability, honesty, teamwork, empathy, mindfulness, interpersonal skills, decision making, time, and stress management. The medical curriculums have been developed based on different approaches and techniques to establish the above attributes in medical students by incorporating them not only in clinical training but also in basic science subjects such as biochemistry. The use of biochemistry to boost professional attributes in medical students has changed significantly over the past few decades. These changes have helped biochemistry to evolve throughout the medical curriculum as one of the essential subjects for medical students.

Biochemistry was initially taught as a freestanding subject. Even now some schools and universities consider biochemistry as a freestanding subject. Although the subject has all the qualifications to stand free, in keeping with interdisciplinary trends in the medical school curricula, many medical schools and universities use integration methods to teach biochemistry courses. This evolution of biochemistry in the medical curriculum has been shown in several reports which have been published globally. Those reports reveal how biochemistry was initially integrated into the medical curriculum and how it was eventually used to develop the professional attributes of the medical students.

One example is the Flexner report¹. The Flexner report was published in the USA in 1910 as a global outcome. In his report, Flexner compared and contrasted the description in the course content in different

medical schools and clinical training institutes in the USA. He exposed the basic science teaching and clinical training in an inquiry that depended on the environment at a university or a hospital. His discovery was felt throughout the world even in Sri Lankan medical education.

Initially, Flexner witnessed less integration in teaching basic science subjects and practical care of patients in most universities and hospitals. However, when medical research became increasingly molecular, the basic science disciplines such as biochemistry expanded into several branches claiming separate departmental status and additional curriculum time. Therefore, curriculum development was changed accordingly. With time, the integration of biochemistry with clinical training became more popular in most countries. Up to date several integration methods are practiced around the world and also medical educators are continuously researching for better integration methods to integrate biochemistry to the medical curriculum.

Frequently Practiced Integration Methods

Medical education over the last two decades has undergone several changes. The term “integrated curriculum” has become more popular among the medical students and also their teachers. Integrated curricula have evolved through history based on knowledge and theory. It has been supported by many national and international medical education organizations, and many educators have shown the necessity of reviewing and promoting further development of the integrated curriculum methods in medical education with an international perspective.

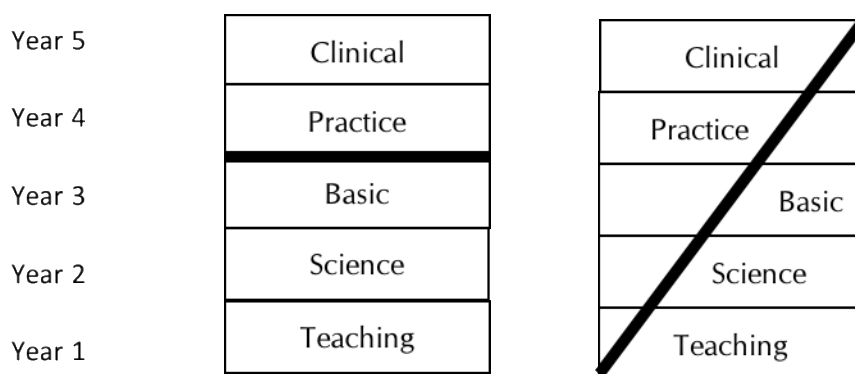


Figure 1: Different Integration Methods Practiced in Medical Education

In the modern medical curriculum, the basics of biochemistry have been designed to be taught clearly and strongly at the foundation level, because it is impossible to continue clinical practice without understanding the concepts and fundamentals of the topics in medicine. There are several

integration models practiced over the last decade to deliver the knowledge of biochemistry to medical students. The Figure 1 shows two basic integration methods that are currently practiced in medical education. The vertical integration, also known as the traditional H-shaped medical curriculum was practiced for a long time.² It represents the standard teaching method where basic science subjects including biochemistry were done in the early years of the curriculum and clinical practice was started much later, separated from basic science education.

However, this traditional method has been replaced by a Z-shaped integration model in which basic science subjects such as biochemistry and clinical practice components are delivered to students maintaining a continuous flow throughout the curriculum². The advantage of Z-shaped integration over H-shaped integration is that the students experience the true integration of basic science subjects to the medical curriculum and receive the clinical practice applications related to theories at the same time.

However, in general, medical students find biochemistry as less challenging than other subjects because they already have the basic understanding of biology and chemistry even before entering their undergraduate curriculum. There are several factors that affect negatively on medical students' interest in learning biochemistry namely, biochemistry often repeats the materials of advanced level biology and chemistry, biochemistry is presented mostly outside the context of medical relevance, there is a large portion of the material that seems irrelevant to their future carrier, and biochemistry requires too much rote memorization that does not last long. Therefore, there is a high demand for developing a better and advanced integration method to deliver biochemistry to the medical students and enrich their interest toward the subject.

New Integration Approaches

Medical educators and researchers around the world have designed and experimented with different new integration methods to deliver biochemistry to medical students in a more meaningful approach. Some of these approaches have failed and been rejected by the students or teachers due to various reasons. However, there are few successful methods that have been developed, tested and accepted with positive feedback from both students and teachers.

Spiral Integrations Method

In the spiral integration method, the medical curriculum is divided into three phases as phase I, II, and III³. Basic biochemistry is normally taught in the initial phase which is the Phase I. Spiral integration method is suggesting to integrate biochemical concepts with other relevant disciplines and topics, and implemented them into all three phases. The gradual

progression of biochemistry from Phase I to II and III makes it possible to implement the subject in a more meaningful and appropriate manner throughout the curriculum.

The spiral integration approach was undertaken by some universities and have shown successful enhancement in teaching and learning methods of biochemistry. This method can be applied to almost all the biochemistry topics that explain the fundamentals of human biology. For an example, the content of metabolism was initially taught under the basis of metabolism including glycolysis, TCA cycle, electron transport chain, and gluconeogenesis in phase I. In the spiral integration method, the basic knowledge is mapped throughout the curriculum, by linking to cardiac muscle metabolism and metabolism in red blood cells in the cardiovascular system module, muscle metabolism under the musculoskeletal and skin module, and hormonal regulation of metabolism under the endocrinology module in phase II. Also, this integration can be extended into the clinical training years following the above topics with more practical contents in phase III.

A research done by interviewing the students who followed a spiral integration curriculum, had revealed that spiral integration of biochemistry content with clinically relevant topics is a well-organized approach accepted by undergraduate medical students in recognized medical schools and universities.

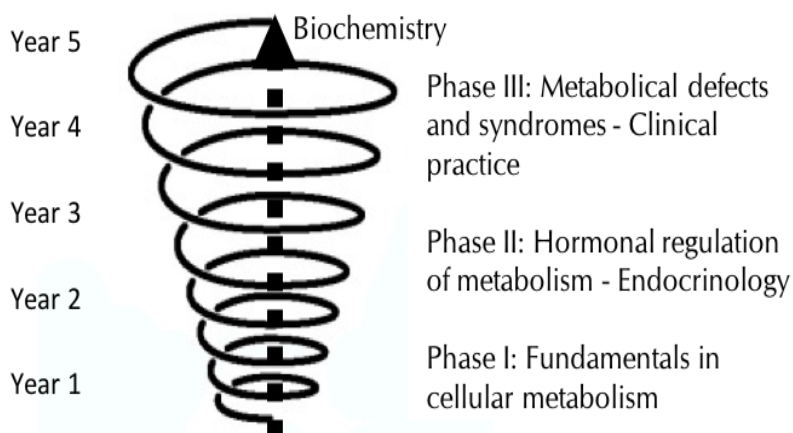


Figure 2: An Example of Spiral Integration Approach: Spiral Integration of Metabolism in Phase I, II, and III

Problem Based Learning

Even though biochemistry has a vast importance in the medical curriculum, it is always challenging to appropriate it to the clinical context. The problem-based learning (PBL) is a concept that delivers fundamental

biochemistry knowledge through clinical problems³. PBL was identified as a suitable platform to integrate biochemistry content with all the other basic sciences and clinical sciences. Several universities have experimented with this method successfully to teach biochemistry to medical students.

This new approach was first introduced in the 2005-2007 period. However, it has still not been very popular among the medical educators. The PBL curriculum is suggested to include biochemistry in the first two years of the medical curricular and to deliver the basic knowledge through an integrated organ system using problems related to clinical scenarios. PBL is also designed to enhance generic skills of communication, leadership, and teamwork of students. For the retention of the biochemistry knowledge, PBL is followed by seminars, assignments, laboratory sessions and supplemented by lectures on difficult concepts, in later clinical training years.

PBL was experimented at Kathmandu University, University of Newcastle, Australia, and University of British Columbia, Canada and the students' response to the new approach was impressively positive³. The students agreed that this was a better integration of the biochemistry content with other disciplines and clinical concepts. The problems related to relevant clinical scenarios have enhanced their interest in biochemistry. However, it is also reported that some students have experienced that the biochemistry content was heavy for the early period of the curriculum.

Improvements Expected in the Local Healthcare System

Our local healthcare system is universal and extends free to all citizens of Sri Lanka. In all major towns and cities, OPD facilities have been established in public hospitals and many laboratories and radiology facilities are readily available in public hospitals. All the physicians and the medical staff working in our hospitals are well-trained and qualified graduates with MBBS degree or equivalent degrees. Eleven medical universities located across the country are responsible to provide qualified graduates from their institutes to the local healthcare system. The primary objective of the medical universities of our country is to produce qualified first-day interns who can adapt to altering requirements in our healthcare system.

Modern days' needs of our public healthcare system are increasing at an alarming rate. In the near future, our healthcare system will face many problems, due to the increasing number of patients, increasing healthcare cost, development of technology, changing attitudes of the patients, and the fluctuating economy of the country. Therefore, it is essential to develop our medical students and their curricula to fulfill the future needs of our healthcare system. Development is required not only to produce productive patient care but also to seek advancements in medical research.

In the past, we have witnessed a few major changes in medical education to compensate with the needs of our healthcare system. When

considering the development of biochemistry in the medical curricula, the major drawback in currently practiced teaching methods is that the contents of biochemistry are not properly integrated with the clinical context. Thus, the students lose interest in the subject and forget most of these important pieces of knowledge when they start their intern training. It will reduce the quality of the medical students and their degrees. Also, it will create a huge void in medical research because biochemistry is the research language of medicine.

The modern integration methods discussed in this article provide a better platform to deliver biochemistry in the medical curriculum to boost the interest on the subject. The main target here is to give maximum support for the students to retain their biochemistry knowledge throughout their career and apply it whenever required. Both the spiral integration method and the problem-based learning method have achieved this by continuously delivering biochemistry contents throughout the curriculum and combining it to the clinical context. These new strategies can improve the quality of future physicians and enhance their engagements in medical research.

Moreover, the proper integration of basic science and clinical practice will support the medical students in their professional transition from students to the physicians. A notable change in the students' attitude towards patient care, critical thinking patterns, and professionalism is also expected. Even though health expenditures in our country are low, the quality of the healthcare system and the health indicators are comparable to more developed countries in the region. Therefore, a few changes in the medical curricula can make a huge improvement in our healthcare. With the recommended changes in medical education, we expect our universities will be able to produce competent graduates to fulfill the future needs of the Sri Lankan healthcare system.

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- ¹ Jayawickramarajah, P. T. (2017). Medical education in Sri Lanka: Perspective of a medical educationist. *J Postgrad Inst Med*, 4, E471-E478
 - ² Brauer, D. G., Ferguson, K. J., Brauer, D. G., & Ferguson, K. J. (2015). The integrated curriculum in medical education: AMEE Guide No. 96 The integrated curriculum in medical education: AMEE Guide No. 96.
 - ³ Maharjan, B. R., Parajuli, B. U., & Shakya, P. R. (2018). Integration of biochemistry into an organ system based medical curriculum using problem based learning. *Journal of Patan Academy of Health Sciences*, 5(2), 98-102.

CHAPTER 17

Does the Narrative Type Storytelling Concept Suit Science and Technology Education at University Level as a Pedagogical Tool?

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Storytelling as the Oldest Form of Education

Throughout the history of mankind and social development, storytelling has been used as a leading tool for sharing knowledge and experience. In any country, culture has been used this concept to pass down beliefs, traditions, and history to future generations. Subsequently, stories will stay with people much longer compared to facts and statistics. The earliest reference to storytelling dates back to 4000 B.C. where Egyptian tales were entitled "The Tales of the Magicians"¹. After the invention of the printing press in 1450, stories became more available in printed form. At present, storytelling is believed as one of the effective methods in teaching-learning at any level of education.

What is the story? It can be defined as a narrative account that raises unanswered questions and characters that may encounter and apparently, they resolve a crisis or crises. A story will be lined up with a beginning, middle, and end. It can be true, fictional, or personal experience. Characters are an important element of any tale and substituting human faces on theories and issues makes materials indelible and concrete.

Storytelling is a process where students personalise what they learn and build their own meaning and the knowledge from stories that they hear. On the other hand, stories are a familiar and accessible form of sharing information which brings abstract concepts accessible and attainable. In a teaching-learning environment, stories can serve multiple functions such as sparking students' interest, assisting the flow of the lecture, making materials memorable, overcoming student's resistance or anxiety and it helps to initiate a rapport between the lecturer and the students or among students themselves². In addition, stories result in motivating the students to think of their own approaches to solve problems as it does not immediately provide the determination. A story keeps students awake, following, and wanting them to find out what will happen next and how the story ends³. Furthermore, a typical student's attention span ranges from 10 to 12 mins as shown in the Figure 1, refreshing them via changing the activity is needed

to make the lecture effective. Adding storytelling events to the lesson plan can also be a suitable method as an ice-breaking activity to overcome such issues.

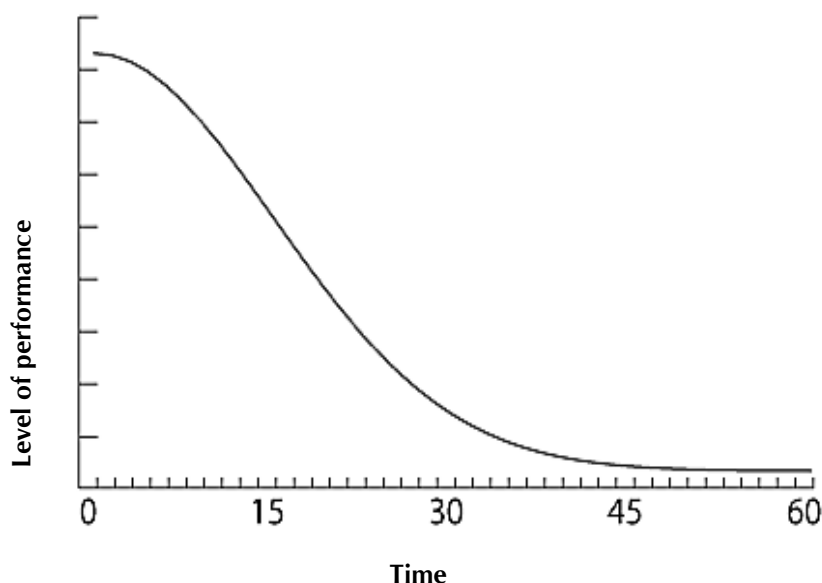


Figure 1. Typical Student's Attention Span During a Lecture

Digital Storytelling

With the advancement of science and technology, digital storytelling emerged in the late 1980s where multimedia tools such as graphics, audio, video, and animations are involved in the storytelling process. These digital stories can be played on a computer, uploaded on a website, or burned on to a DVD. Digital storytelling is defined as a modern expression of the conventional art of storytelling. It combines digital media with innovative teaching and learning practices. It is a fact that integrating visual images and text enhances and accelerates student's comprehension that act as a hook to capture the attention of students and increase the interest to explore new ideas⁴. It also enhances learner's motivation and supports teachers to focus on integrated approaches in curriculum developments. Apparently, it leads to higher-order thinking and deep learning of students. Digital storytelling is a powerful model for creating an e-learning environment. It can keep students actively engaged, and create self-directed and lifelong learners in the long run⁵. In addition, students get the opportunity to improve their communication skills as they learn to organise their ideas, express opinions, and construct narratives⁶. Students also learn to evaluate their own work as well as others which facilitate emotion management⁷. However, it is important to have easy access to technology without a shortage.

Beyond the Traditional Storytelling

As an example, an extract from a narrative story called “A Matter of Love” which was used to teach physical states of matter (A Science concept) for school students is given below.

“Once upon a time there was a kingdom called ‘Matter’, where millions and millions of substances lived. The matter had three countries or states: solid, liquid, and gas. In the solid state, all substances had a fixed size and a fixed shape. In the liquid state, all substances had a fixed size, but not a fixed shape (their shape depended on the house or container they lived in). And in the gas state substances had no fixed size or fixed form (they moved freely)”⁸.

However, the fundamental question which comes to our mind is, how far can we apply this strategy of storytelling for science and technology/engineering students at the tertiary level. However, this type of narrative storytelling-based methods might be appropriate for fine arts/humanities undergraduates since they are more sensitive to such approaches compared to science and engineering students. The majority of science and technology students have the attitude that narrative stories may have more to do with entertainment than learning.

On the other hand, narrative-type storytelling has been widely used among school students⁹ and university level courses in humanities and business such as historical narratives to teach about the historical events and their impact. A recent study by Easton (2016)¹⁰ to evaluate the efficacy of the narrative lectures among medical students shows that narratives may be particularly relevant in promoting humanistic aspects of medicine, including professional identity and empathy. Adams et al.¹¹ have studied the use of storytelling techniques among engineering students providing a platform for students to share their stories and challenges during a conference. However, this strategy causes a deviation from a typical lecture in a classroom and they have pointed out the value of having a community or forum that practice storytelling for sharing stories about the challenges and strategies of navigating engineering education research and careers.

Therefore, it is clear that when the storytelling concept is introduced for the science and engineering undergraduates during the lecture, it has to be done in an alternative way compared to the narrative-based stories. One of the best options that can be used is, explaining the history of the concept or the theories to be discussed along with the lecturer’s personal experiences. Sharing such experiences makes the subject comes a live and story of how the lecturer himself or herself managed to understand and grasp the concept when he or she was in their situation is an effective and alternative way for traditional storytelling. Furthermore, telling a story from experience helps to build a more personal student-teacher relationship. At the same time, that kind of approach can be used as a vehicle to improve the mindset of students as the lecturer gets the opportunity to inspire students

sharing his or her experiences. That helps students to set their goals and work hard to achieve them in an ethical way. In my personal experience, this has been well mentioned in students' feedbacks for the courses I have been engaging for both undergraduate and postgraduates teaching at the state university system.

A Case Study from Own Undergraduate Classes

Any undergraduate who pursues a degree in biological sciences, agriculture, or food sciences has to take compulsory chemistry courses during the first two years of their degree program and under those courses, they have to study the DNA double helix structure. DNA, (deoxyribonucleic acid) is the hereditary material in humans and most of all other organisms. The information in DNA is stored as a code made up of four chemical bases that provide the direction for protein synthesis in the cell. I have tried two different approaches to teach the DNA structure as shown in Figure 2 (a) and 2(b). In the 1st approach as depicted in Figure 2 (a), DNA structure is taught straight forward as facts. In the second approach, it is taught as a story. However, a narrative story will not be employed and the history of the discovery and interesting incidents related to the event are discussed¹². In both cases, digital technology such as PowerPoint presentations is used. Furthermore, I discuss my own experiences related to the place of the discovery as well.

1. How Watson and Crick met at Cavendish Laboratory Cambridge and worked together to unlock the DNA structure
2. Parallel to a similar work carried out at University College of London on X-Ray studies of DNA by Wilkins and Rosalind Franklin (A Cambridge graduate)
3. Watson and Crick with the support of published X-Ray data of DNA by Franklin, on February 28, 1953, were able to discover the DNA structure and Francis Crick entered the pub called Eagle in Cambridge, England to share in their exciting news. He announced, "We found the secret of life"
4. In 1962, Watson, Crick, and Wilkins were awarded the Nobel Prize for physiology and medicine. Franklin did not share in the prize as she had already died of cancer in 1958 at the age of 37.
5. My personal experience with Cavendish Lab at Physics Department, Chemistry Department, Cambridge, and Eagle Pub where they announced the discovery of DNA is shared with students.

It was observed that presenting the DNA structure with a story is so effective compared to a straightforward discussion of the chemistry behind and furthermore, the friendly atmosphere created at the classroom helps to develop the social and emotional abilities of students while making them

inspired. However, students from science and technology streams, especially at the university level, do not entertain narrative-type traditional stories, and instead, they are fond of listening to a story with the lecturer's experiences. Non-narrative storytelling concept along with lecturer's experience will be the best fit for science and technology undergraduates while preserving the student attention which generally spans only for 10-15 minutes.

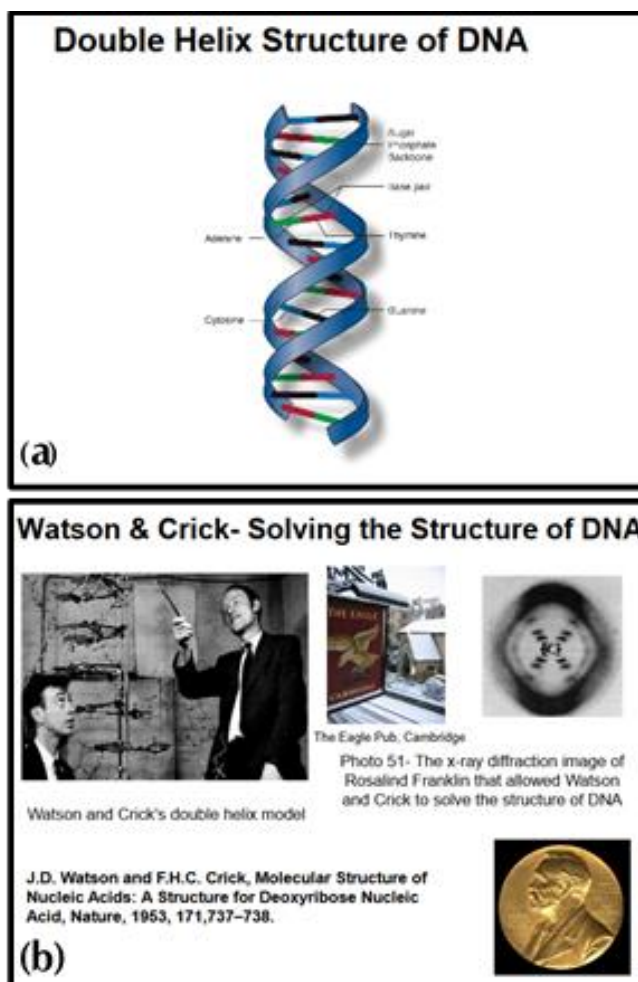


Figure 2. PowerPoint Slide of DNA Structure
(a) Straight and (b) With a Story

Considering my personal experience and the feedback received from the students, it was evident that the non-narrative storytelling concept along with the lecturer's experience is successful and during my lesson planning, attention was given to this aspect. That encouraged me to read more about the background of many scientific discoveries that are to be taught to both

graduate and undergraduate students who pursue science or technology degree programs including engineering. Furthermore, perusing my higher studies in an academic institution where major discoveries came from during the 20th century immensely helped me to have some of my own experiences visiting those sites and actively engaging with ascendants from the same laboratories. I also have been collecting more practical information which can be used as a piece of a story during my lecture whenever I travel (local or abroad) either for academic purposes or personal. It can be suggested that the non-narrated digital storytelling concept along with the lecturer's experience will be a successful teaching-learning tool for science and technology/engineering education at the university level. In conclusion, it is well established that narrative-type storytelling is a successful pedagogical tool for almost every stream. However, this article suggests the fact that the non-narrative storytelling concept along with stories based on the lecturer's experience will be the best fit for science and technology/engineering tertiary level students.

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- ¹ Sawyer, R. (1942). *The Way of the Storyteller*. New York: Penguin Books.
 - ² Mokhtar, N.H., Halim, M.F.A. and Kamarulzaman, S.Z.S. (2011). The Effectiveness of Storytelling in Enhancing Communicative Skills. *Procedia Social and Behavioral Sciences*, 18, 163–169.
 - ³ McDowell, K. (2018). *Storytelling: Practice and process as non-textual pedagogy*. *Education for Information*, 34(1), 15–19
 - ⁴ Burmark, L. (2004). Visual presentations that prompt, flash & transform. *Media and Methods*, 40(6), 4–5.
 - ⁵ Benmayor, R. (2008). Digital storytelling as a signature pedagogy for the new humanities. *Arts Humanit High Educ*, 7(2), 188–204.
 - ⁶ Smeda, N., Dakich, E. and Sharda, N. (2014). The effectiveness of digital storytelling in the classrooms: a comprehensive study. *Smart Learning Environments*, 1(1), 1-6.
 - ⁷ Robin, B.R. (2008). Digital Storytelling: A Powerful Technology Tool for the 21st Century Classroom. *Theory into Practice*, 47(3), 220–228.
 - ⁸ Cubillo, S.A. and Manzanares, J.A. (2017). Storytelling as a tool for science teaching in bilingual primary education. *Enseñanza de Las Ciencias, (Extra)*, 5085-5090.
 - ⁹ Banister, F. and Ryan, C. (2001). Developing science concepts through storytelling. *School Science Review*, 83(302), 75-83.
 - ¹⁰ Easton, G. (2016). How medical teachers use narratives in lectures: A qualitative study. *BMC Medical Education*, 16(3), 1-12.
 - ¹¹ Adams, R., Allendoerfer, C., Smith, T.R., Socha, D., Williams, D. and Yasuhara, K. (2007). Storytelling in Engineering Education, American Society for Engineering Education Annual Conference. Oahu, HI: American Society for Engineering Education
 - ¹² Watson, J.D. and Crick, F.H.C. (1953). Molecular Structure of Nucleic Acids: A Structure for Deoxyribose Nucleic Acid, *Nature*, 171(4356), 737–738.



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